The AMERICAN SOCIETY OF HOSPITAL PHARMACISTS, an affiliate of the American Pharmaceutical Association, is a national organization devoted to the profession of hospital pharmacy and dedicated to the improvement of pharmaceutical service in the interest of better patient care in hospitals.

MEMBERSHIP in the AMERICAN SOCIETY OF HOSPITAL PHARMACISTS and the American Pharmaceutical Association is open to all practicing hospital pharmacists. With membership are included subscriptions to the AMERICAN JOURNAL OF HOSPITAL PHARMACY and to the *Journal* of the American Pharmaceutical Association, Pract. Pharm. Ed., as well as the several services of each organization.

ADVERTISING will be accepted, subject to editorial approval, for prescription products as well as for other items used extensively in hospitals. Inquiries should be sent to the Associate Editor of the AMERICAN JOURNAL OF HOSPITAL PHARMACY, 1020 Ferdon Road, Ann Arbor, Mich.

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American Journal of Hospital Pharmacy

American Society of Hospital Pharmacists

VOLUME 15 NUMBER 9 SEPTEMBER 1958

articles

departments

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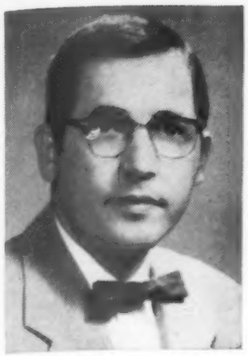


as the vice-president sees it—

CLIFTON J. LATIOLAIS

► THE SUMMER SEASON OVER—many affiliated chapters are resuming monthly meetings. This means that their respective committees are in the throes of program planning. Perusal of the "ASHP Affiliates" section of the JOURNAL readily convinces one that most committees are doing an excellent job of planning interesting meetings which contribute to the dissemination and interchange of information among hospital pharmacists. This is one of the main objectives of the affiliated chapter. Subjects discussed at local meetings vary from pharmacology to pharmacy administration, from purchasing to poison control centers and from radiobiology to recent advances in the diagnosis of nervous system disorders. Undoubtedly, the variety of topics presented indicates that hospital pharmacists are generally interested in keeping attuned to advances not only in hospital pharmacy but in many other areas involving the overall patient care program.

Such meetings have contributed immeasurably toward the development and upgrading of many facets of hospital pharmacy practice. Some areas of practice have been polished to the point where it now becomes difficult to make additional improvements. On the other hand, the quality and scope of other services and activities still require considerable attention. Although progress in hospital pharmacy may be apparent in the fourth estate, it can only become a reality when its effects are felt and used in the individual hospital. Here then is a ripe area where affiliated chapters can serve as a potent force in helping hospital pharmacists to effectuate progressive developments in their pharmacies through the medium of the 'monthly meeting.'

The SOCIETY brings to fruition each year important projects relating to the development and improvement of hospital pharmacy service. Ideas for many of these projects come from the affiliated chapters. Because of the complexity of this project, the SOCIETY has been requested to seek a solution. But, in so many instances, the answer which the national SOCIETY brings forth is not, in a sense, the final solution. Any plan offered must be implemented on a local level. Here then is the void. The affiliated chapter must accept this final problem and help the individual member. For example, hospital pharmacists have long recognized the need for a 'formulary service' on a national level. The national SOCIETY accepted the challenge, worked on the problem, and came up with an answer now known as the *American Hospital Formulary Service*. Local chapters can work effectively toward solving the implementation problem by scheduling on their programs a comprehensive discussion of the *American Hospital Formulary Service*. This would help the individual pharmacist utilize the service effectively in his own particular hospital. Thus, program committees might well consider this suggestion for one of their forthcoming meetings.

Space permitting, may I offer several additional topics, emanating from SOCIETY activity, as program suggestions for affiliated chapter meetings. First, safety practices and procedures as related to medications accidents require the attention of every hospital pharmacist. Last year's report of the Committee on Safety Practices and Procedures could serve as the basis for an illuminating discussion as to what specific action every hospital pharmacist in the local chapter might take to minimize the occurrence of medication errors in his own hospital.

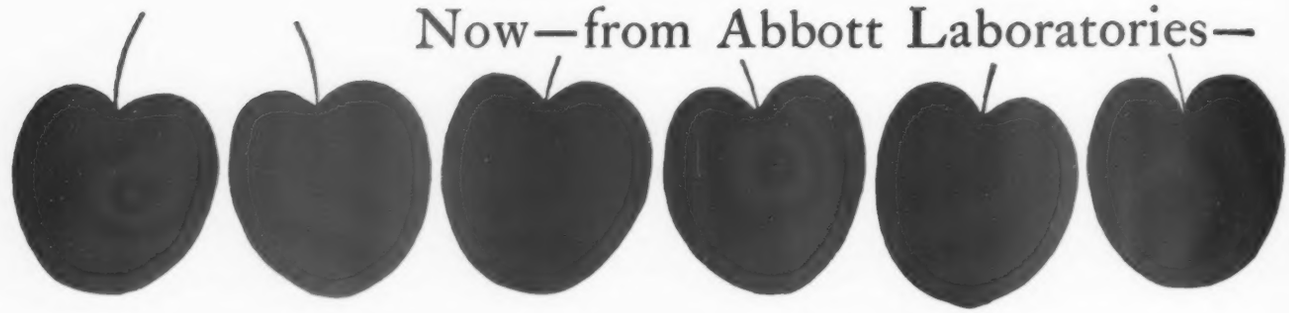
You are probably aware of the statement of principles involved in the use of investigational drugs in hospitals that has been approved by the American Hospital Association and the ASHP. How a hospital pharmacist might work effectively with his administrator and Pharmacy and Therapeutics Committee in establishing policies and procedures for handling investigational drugs could serve as the basis for another valuable and informative local chapter meeting.

Last year the SOCIETY initiated a long range plan to revise the Minimum Standard for Pharmacies in Hospitals. Every practicing hospital pharmacist is requested to participate in this project through his affiliated chapter. Thus, one or more meetings devoted to a critical analysis of the present Minimum Standard may bring forth valuable suggestions and recommendations for use by the Committee on Minimum Standards. In addition, such discussions would acquaint pharmacists with current standards of practice and would also indicate to them which areas of their departments need improvement.

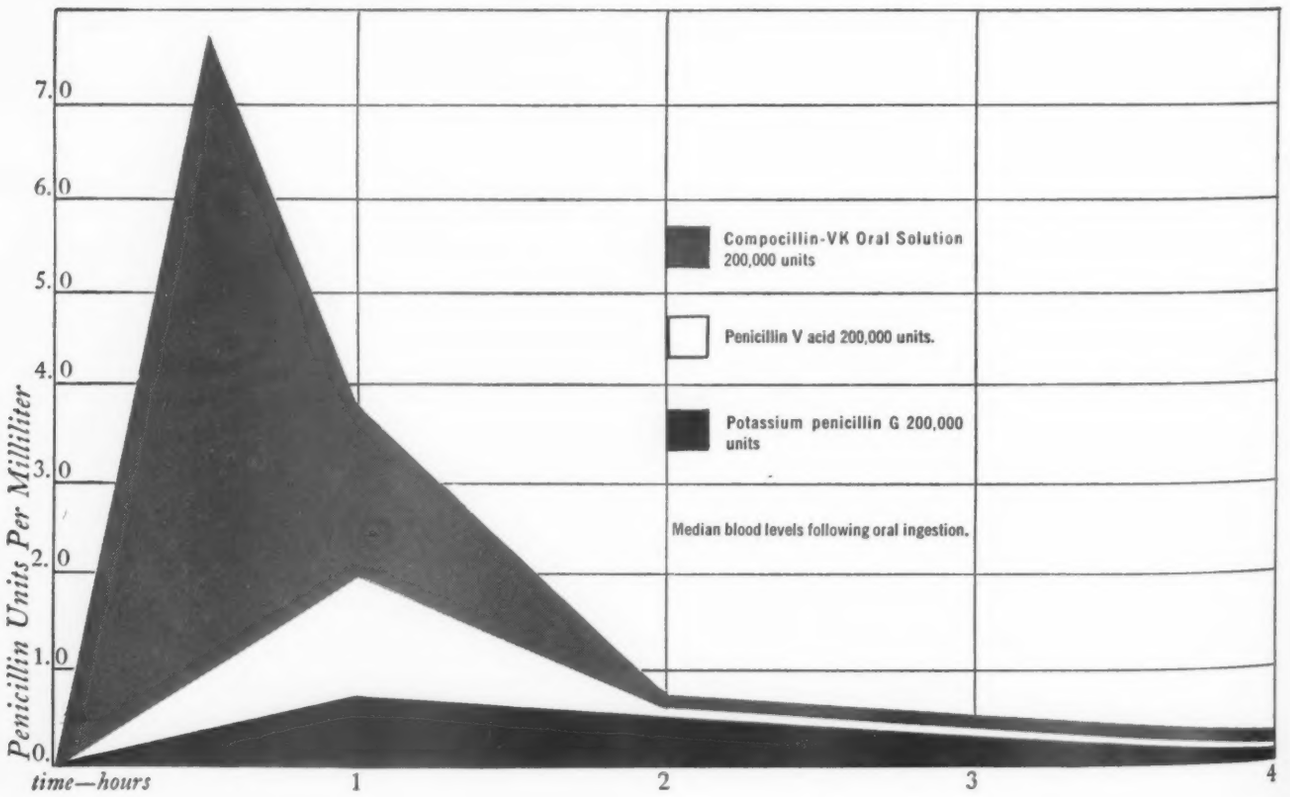
By fostering such programs, affiliated chapters can be a dynamic force behind the improvement of pharmacy service in the individual hospital.

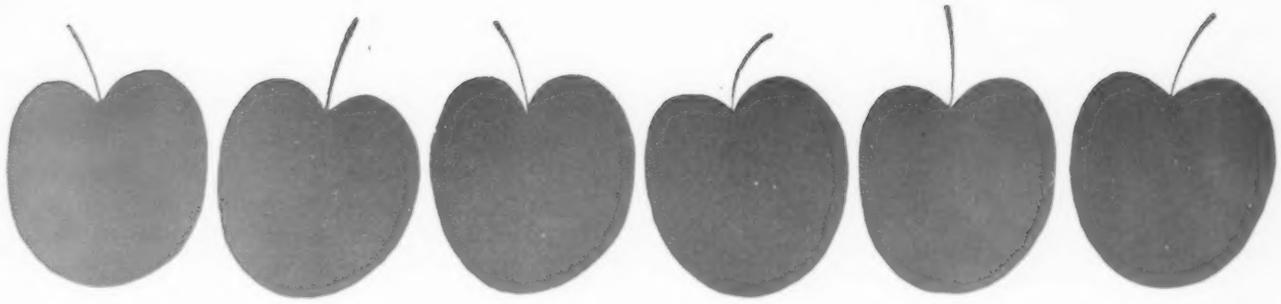
CLIFTON J. LATIOLAIS

Now—from Abbott Laboratories—

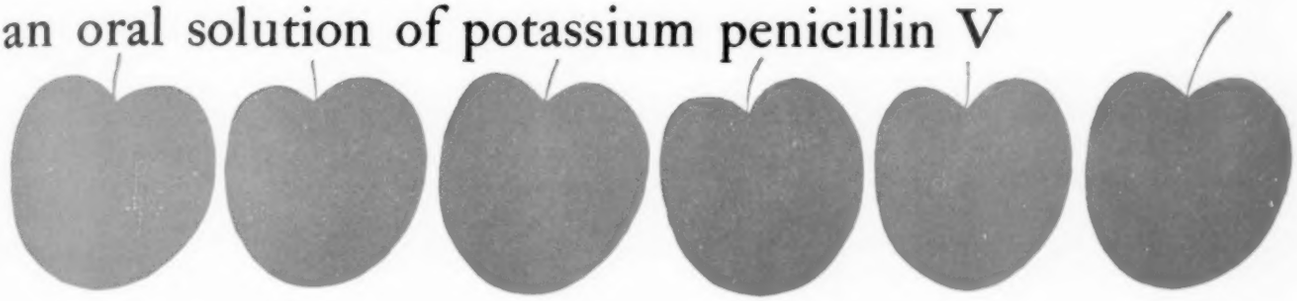


Good-tasting, cherry-flavored...

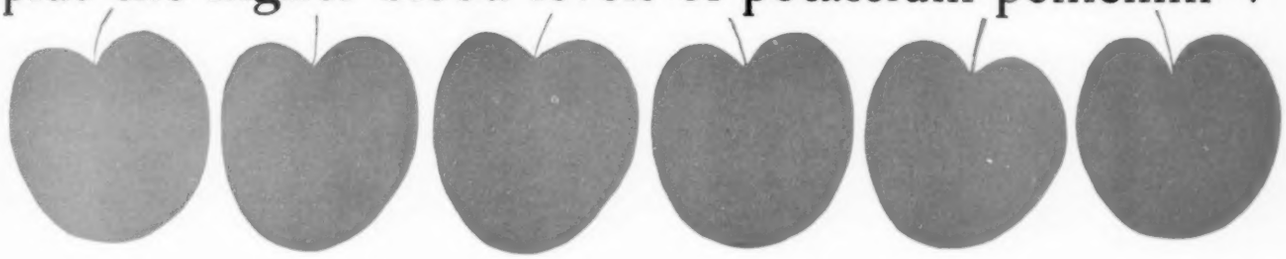




an oral solution of potassium penicillin V



plus the higher blood levels of potassium penicillin V



POTASSIUM PENICILLIN V

Compocillin®-VK

granules for oral solution

Now, for oral administration, COMPOCILLIN-VK Granules offer you a solution of potassium penicillin V. Developed by Abbott Laboratories, the granules are dry and reconstituted with water.

The clear, red solution has a fresh, cherry flavor, is taste-tested and is well-accepted by patients. And they'll get those high potassium penicillin V blood levels (note chart).

COMPOCILLIN-VK is indicated for all infections susceptible to oral penicillin therapy. Also, in treating recurring rheumatic fever and in managing rheumatic carditis. May be used in counteracting complications from severe viral attacks.

The initial recommended dose: In acute infections, the range is from 125 mg. (200,000 units) three times daily to 250 mg. (400,000 units) every four hours. For young children, the adult dose may be reduced in proportion to age and weight. For prophylactic use, 125 mg. (200,000 units) may be administered once or twice daily.

COMPOCILLIN-VK Granules for Oral Solution come in 40-cc. and 80-cc. bottles. Each 5-cc. teaspoon of the reconstituted solution represents 125 mg. (200,000 units) of potassium penicillin V. The dry granules stay stable under ordinary room temperatures. When reconstituted, the cherry-flavored solution will remain potent for two weeks under refrigeration.

Abbott

News

Army Medical Service To Publish Formulary

The Army Medical Service Formulary will be released in late August 1958 for world-wide distribution throughout the U. S. Army Medical Service.

Compiled by Lt. Col. William L. Austin, Chief Pharmacy Consultant to the Army Surgeon General, the Formulary will provide a convenient reference source of essential data on the Army's current therapeutic armamentarium and will insure uniformity in military medical therapeutics.

The new Formulary, published as Technical Manual 8-245, will be available on request through regular Adjutant General channels. It will serve as the basic source of reference for clear, concise, and definitive information concerning drugs, both standard and nonstandard, available to military physicians for use in the treatment of disease.

The Formulary is divided into four parts. Part One contains general information relative to pharmacy management, prescription writing, and the Therapeutic Agents Board system. Part Two contains a series of monographs on individual drugs, arranged according to therapeutic use or pharmacologic action. Part Three contains valuable information on poisons and their suggested antidotes. Part Four contains standard stock formulas for those preparations manufactured most frequently in Army pharmacies.

The Formulary will also serve as a practical guide to the selection of the "drug of choice" for therapeutic practices for Army Medical Service personnel who are transferred from one medical treatment facility to another. The Formulary's pocket-size design in looseleaf form will provide maximum flexibility, since revisions can be inserted easily and rapidly without arduous "posting."

While not intended to be restrictive upon the Army medical officer in his practice of military medicine, the Formulary will reflect the current thinking of experienced military medical leaders. These medical leaders, through the Therapeutic Agents Board system, are making every effort to develop a progressively strengthened compilation of therapeutic agents, the use of which will result in improved operational procedures, better teaching methods, and an ever higher standard of medical and pharmaceutical medicine.

Wittop-Koning To Receive Urdang Medal

The American Institute of the History of Pharmacy will award the fourth George Urdang Medal to Dirk Arnold Wittop-Koning, eminent historian of pharmacy of The Netherlands. Dr. Wittop-Koning operates a pharmacy in Amsterdam, teaches history of pharmacy at the Municipal University of Amsterdam, and is curator of the Dutch Medical-Pharmaceutical Historical Museum.

Dr. Wittop-Koning receives the international award particularly for his series of books: *Nederlandse Vijzels* (1953), *Delft Drug Jars* (1956), *Nederlandse Gewichten Stensels, Ijkwezen, Vormen, Makers en Merken* (1953, with K. M. C. Zevenboom), *Art and Pharmacy* (vol. 1, 1950), as well as numerous papers of high quality.

Dr. Wittop-Koning serves as treasurer of the International Society of the History of Sciences, the International Academy of the History of Pharmacy, and the World Union of Societies for Pharmaceutical History. He played a significant part in founding the latter two organizations and the Cercle Benelux for the History of Pharmacy. He holds honorary memberships in various societies for the history of pharmacy and in 1956 was honored with the Schelenz Plaque.

"At forty-seven, Dr. Wittop-Koning will be the youngest recipient of the Urdang Medal thus far," Dr. Glenn Sonnedecker, Director of the American Institute of the History of Pharmacy, points out. "The medalist has a promising and productive career still before him. One of his objectives is to establish an institute for the history of pharmacy within the framework of the Medical-Pharmaceutical Museum and the University of Amsterdam. He also hopes to revise Stoeder's book dealing with the history of pharmacy in Holland."

Dr. Wittop-Koning will be the fourth recipient of the Urdang Medal, which was established in 1952 on the 70th birthday of Dr. George Urdang, now Director-Emeritus of the American Institute of the History of Pharmacy. Joint sponsors are the Institute and the pharmacy faculty of the University of Wisconsin. It is expected that the Medal will be conferred upon Dr. Wittop-Koning at one of the pharmaceutical meetings in Europe later this year.

The Urdang Medal is awarded "for original and scholarly publications or series of publications pertaining primarily to historical or historico-social aspects of pharmacy, appearing anywhere in the world." The members of the International Academy of the History of Pharmacy cooperate in the recommendation of candidates from various parts of the world; and a Committee of the Academy evaluates the candidates thus recommended.

CONTINUED ON PAGE 756

WHY RISK DELAYED RECOVERY FROM

ENTERITIS?

Staphylococcic enteritis and other serious staph infections among hospitalized patients may be refractory to all antibiotics except CATHOMYCIN (novobiocin). For such infections, CATHOMYCIN constitutes an ideal antibiotic. It has an established record* of effectiveness against strains of organisms resistant to most other antibiotics. When administered in combination with other antibiotics, CATHOMYCIN protects against the emergence of resistant strains.

CATHOMYCIN produces therapeutic blood levels quickly—usually maintaining these levels for 12 hours or more. The drug does not destroy beneficial intestinal flora. It is generally well tolerated and shows no evidenee of cross-resistance with other antibiotics.

CATHOMYCIN®

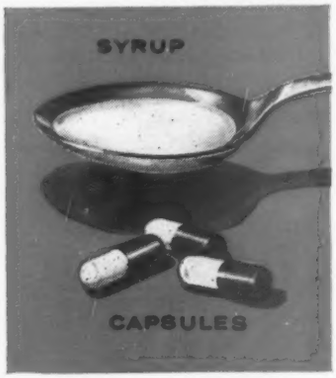
NOVOBIOCIN

for staphylococcic septicemia, enteritis, postoperative wound infections and other serious staph infections.

DOSAGE: Adults: CATHOMYCIN Sodium 2 capsules b.i.d. or CATHOMYCIN Calcium Syrup 4 teaspoonfuls b.i.d. Children: (up to 12 years) 2 to 8 teaspoonfuls daily in divided doses based on 10 mg. CATHOMYCIN per lb. of body weight per day.

SUPPLIED: Capsules sodium novobiocin, each containing the equivalent of 250 mg. of novobiocin—vials of 16 and 100—and as an orange-flavored syrup (aqueous suspension), in bottles of 60 cc. and 473 cc. (1 pint). Each 5 cc. CATHOMYCIN Syrup contains 125 mg. (2.5%) novobiocin, as calcium novobiocin.

*Complete bibliography available on request.



MSD MERCK SHARP & DOHME Division of MERCK & CO., Inc., Philadelphia 1, Pa.

News

CONTINUED FROM PAGE 752

The award may be made each year that there is an entry "clearly exhibiting the superior quality and distinctive significance that the Medal is intended to promote and recognize."

Previous recipients of the Urdang Medal are the following eminent pharmacist-historians: Josef Anton Häfliger of Switzerland (1953), Eugene-Humbert Guitard of France (1954), and Rafael Folch y Andreu of Spain (1955).

► ESTABLISHMENT OF A NATIONAL ADVISORY COMMITTEE ON RADIATION has been announced by Dr. Leroy E. Burney, Surgeon General of the Public Health Service.

The committee will advise the Surgeon General on the further development of Service programs dealing with public health aspects of radiation from all sources. In announcing establishment of the committee, Dr. Burney said that "the development of adequate safeguards against the hazards of radiation must be regarded as an increasingly important public health responsibility."

Present activities of the Service in this field include research, epidemiological studies, radiation monitoring of milk, water, and air, and technical assistance to the States on radiation safety measures. Dr. Russell H. Morgan, Professor of Radiology, Johns Hopkins Hospital serves as chairman of the new committee, which held its initial meeting March 13.

New Medical Publication

A new monthly medical publication, "Patterns of Disease," is being offered to the medical profession by Parke, Davis & Company.

Designed to provide information which physicians can use to anticipate health problems in their areas, to determine which diseases they will encounter most often, among various age groups and in various localities, and to choose the field of specialty most useful to their own communities, the publication will provide statistics on all aspects of commonly encountered medical problems. The current issue emphasizes the problems in geriatrics and future issues will deal with such topics as cardiovascular disease, arthritis, allergic diseases, diabetes, and mental health.

American Dental Association To Observe Centennial

The American Dental Association will mark the 100th anniversary of its founding in 1959, providing a unique opportunity for the dental and allied trades and industries to share in the nation-wide centennial observance. The theme for the centennial celebration will be "A Century of Health Service."

The observance of the centennial year will begin early in 1959 with local and state programs throughout the United States. This series of meetings will culminate in the 100th Annual Session of the Association in New York on September 14-18. This session will be international in character and will attract many visitors from abroad. An elaborate scientific and exhibit program will be presented in the Coliseum.

The centennial observance will include numerous special projects which will present opportunities for participation by the members of the dental trades and industries. Among these projects are a centennial motion picture, radio transcription, television film shorts, centennial souvenirs, historical paintings and a motion picture report of the centennial session. All of these projects are designed to focus national attention upon dental health, the dental profession, the dental trades and industries and the American Dental Association. They will be coordinated in a continuing public relations program for dentistry throughout the centennial year.

A special centennial insigne has been developed and this will be made available for use by advertisers and others who wish to relate their programs to the centennial observance.

To call attention to the New York session, a preliminary program, which will carry advertising, will be issued early in 1959. It will be followed by an elaborate souvenir program for use at the session in September. Information on these publications is available from the Director of Advertising and Exhibits, American Dental Association, 222 East Superior Street, Chicago 11.

"The members of the dental trades and industries, which have contributed so much to the progress of American dentistry, are invited particularly to participate in the centennial observance," Dr. Harold Hillenbrand, secretary of the American Dental Association, said. "Their services and products are an integral part of American dentistry which will be on exhibit to a world-wide audience at the centennial session."

Requests for further information should be addressed to the Secretary, Centennial Staff Committee, American Dental Association, 222 East Superior Street, Chicago 11.

► The nation's investment in hospital resources is at an all-time high, according to information released from Health Information Foundation.

In its monthly statistical bulletin, *Progress in Health Services,* the Foundation stated that the total value of hospital buildings, equipment, and other assets today stands at about $13 billion—or three and two-thirds times the investment 30 years ago.

The current figures breaks down to $8,100 per hospital bed, $590 per patient admitted to a hospital during the year, or $78 per person in the United States.

to fill the BUFFERIN® need

Quickly, Economically
BUFFERIN 1,000'S

in amber bottles especially designed for the modern hospital pharmacy.

saves money
saves dispensing time
saves shelf space

BUFFERIN—the better tolerated antacid analgesic—is especially valuable for the treatment of arthritis and other conditions which require high-dosage, long-term salicylate therapy. BUFFERIN *contains no sodium,* thus is suitable for patients on salt-free diets.

Each BUFFERIN tablet combines 5 grains of aspirin with the antacids aluminum glycinate and magnesium carbonate.

Clinical Data Available on Request

ANOTHER FINE PRODUCT OF BRISTOL-MYERS

Bristol-Myers Company, 19 West 50 Street, New York 20, N. Y.

new... wide-range nitrofuran
controls the "problem pathogens" of
bacterial diarrheas and enteritis

FUROXONE®

brand of furazolidone

FUROXONE LIQUID

A finely divided suspension containing Furoxone, 50 mg. per 15 cc., with kaolin and pectin for added demulcent and adsorptive effect ■ Pleasant orange-mint flavor ■ For patients of all ages (may be mixed with infant formulas; passes through a standard nursing nipple)

■ Supplied in bottles of 240 cc.

FUROXONE TABLETS

Scored brown tablets containing Furoxone, 100 mg.

■ Supplied in bottles of 20 and 100 tablets.

■ **Perorally effective against a wide range of enteric bacteria[1,2]—including common pathogenic species and strains of Escherichia, Salmonella and Staphylococcus not adequately controlled by antibiotics and sulfonamides.** ■ **Bactericidal rather than bacteriostatic.**

■ **Does not induce development of significant bacterial resistance, nor predispose to monilial or staphylococcal overgrowth.**

■ **No toxicity reported.[1]**

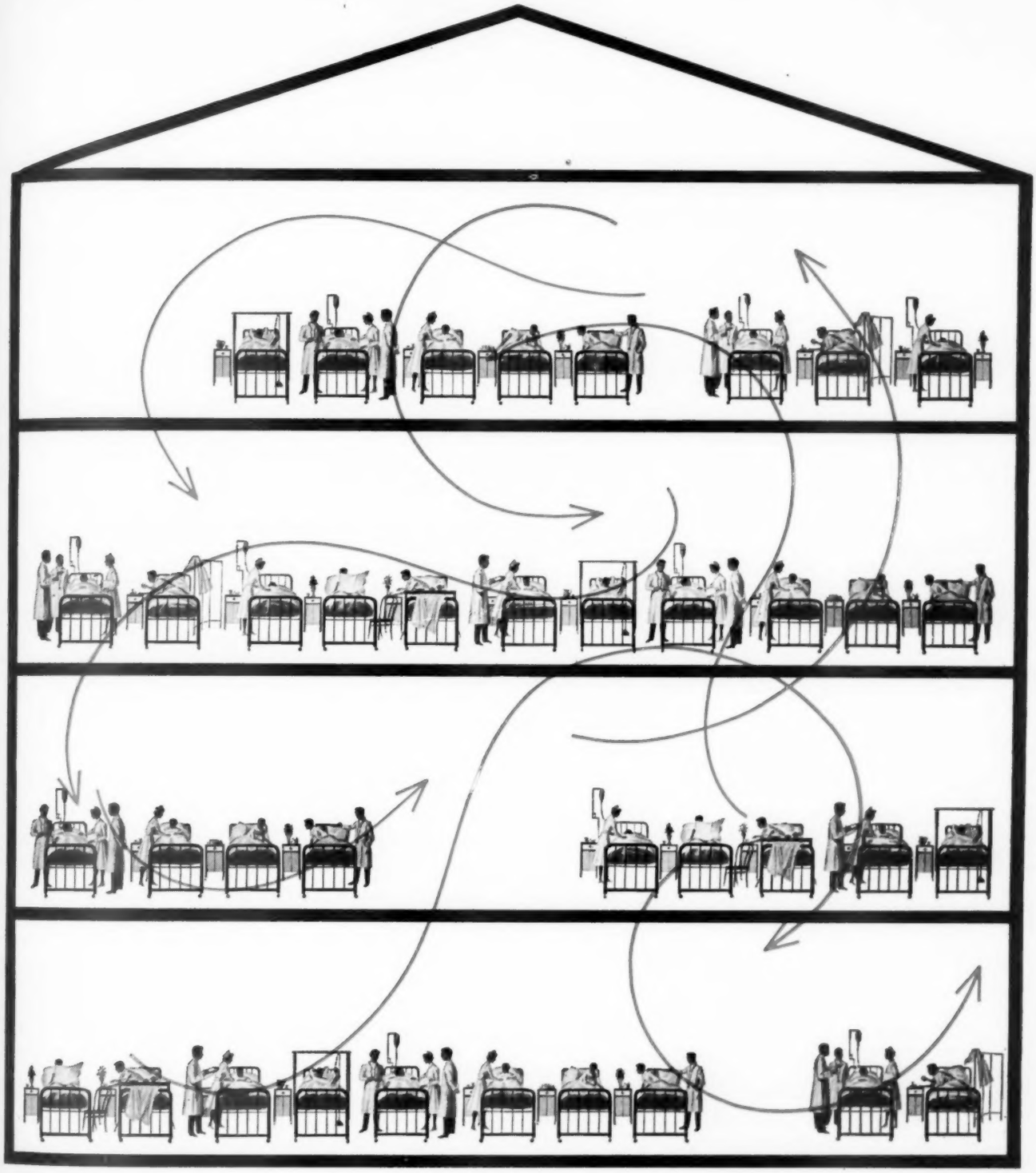
■ **Side effects infrequent. Mild sensitization (rash), nausea or emesis may occur occasionally.**

1. Ponce de Leon, E.: Antibiotic Med. & Clin. Therapy 4:816, 1957.

2. McFadden, H. W. and Musselman, M. M.: Personal communication to Eaton Laboratories.

NITROFURANS—A unique class of antimicrobials Products of Eaton Research

Eaton Laboratories, Norwich, New York



STOP "HOSPITAL STAPH" WITH ALBAMYCIN*

Antibiotic-resistant strains of Staphylococcus are meeting their match in Albamycin. Because Albamycin shows no cross resistance with any commonly used antibiotic, it is dramatically effective against unyielding staphylococcal pneumonia or superinfections of pneumococcal pneumonia.

Whether resistant staph is known or suspected, *Albamycin is indicated.*

ADMINISTRATION AND DOSAGE: The dosage for adults is 500 mg. Albamycin administered intramuscularly or intravenously every 12 hours. As soon as the patient's condition permits, parenteral Albamycin should be replaced with oral Albamycin therapy.

SUPPLIED: Available as 250 mg. capsules; syrup containing 125 mg. Albamycin per 5 cc.; and in the 500 mg. Mix-O-Vial.†

*TRADEMARK, REG. U. S. PAT. OFF.—THE UPJOHN BRAND OF CRYSTALLINE NOVOBIOCIN SODIUM

†TRADEMARK, REG. U. S. PAT. OFF.

The Upjohn Company, Kalamazoo, Michigan

Upjohn

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"We use disposable TUBEX injectables to save labor and money all through the hospital."

TUBEX injectables save labor, time, and money—in a period of rapidly rising hospital costs. This is proved in hospital studies.[1] The TUBEX principle definitely increases efficiency at many hospital levels. It simplifies accounting procedures. It provides better, simpler control of narcotics and inventory. It eliminates the injectable work of central sterile supply. It abolishes medication preparation. It permits more efficient use of nurses' time. And it removes a primary source of serum hepatitis.

TUBEX disposable units supply at least 75% of the medications required in hospital injection.

1. Hunter, J.A., et al.: Hosp. Management 81:82 (March) 1956, 81:80 (April) 1956, 83:86 (March) 1957. Reprints are available from your Wyeth Territory Manager or write Wyeth, P.O. Box 8299, Philadelphia 1, Pa.

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Take 16 SECONDS *to make this convincing test**

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INCERT eliminates ampules, needles, syringes and all the preparation time required with the old way of "needling" solutions. Simply plug the **INCERT** vial into the large hole in the stopper of the I.V. bottle – and the job is done.

INCERT provides a sterile, safe, single-step "closed system" method of adding a variety of medications to solutions. The **INCERT** vial, left in position in the solution bottle, identifies the medication until ready for use.

Here is a real economy in lighter work-load and reduced preparation costs . . . ready for instant use in your hospital.

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INCERT T41—Thiamine HCl 25 mg., Riboflavin 10 mg., Niacinamide 100 mg., Sodium Pantothenate 20 mg., Pyridoxine HCl 20 mg., Ascorbic Acid 500 mg.
INCERT T42—Same as above, with 1000 mg. Ascorbic Acid and Cyanocobalamin (B_{12}) 25 mcg.
VI-CERT® (Lyophilized B Vitamins with Vitamin C).
INCERT T16—500 mg. lyophilized succinylcholine chloride.
INCERT T17—1000 mg. lyophilized succinylcholine chloride.

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SUX-CERT (Lyophilized succinylcholine chloride for skeletal muscle relaxation).
INCERT T110—500 mg. in 5 cc. sterile solution.
INCERT T140—1000 mg. chloride in 10 cc. sterile solution.

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INCERT T2010—20 mEq K+ and Cl– in 10 cc. sterile solution (2 mEq/cc.).
INCERT T2030—30 mEq K+ and Cl– in 12.5 cc. sterile solution (2.2 mEq/cc.).
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INCERT T31—(1.579 gm. K_2HPO_4 and 1.639 gm. KH_2PO_4 per 10 cc.). Contains 30 mEq K+ and HPO_4= in 10 cc. sterile solution.

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announcing... a significant improvement in the most advanced ACTH!

ELECTROLYTIC CORTROPHIN®-ZINC

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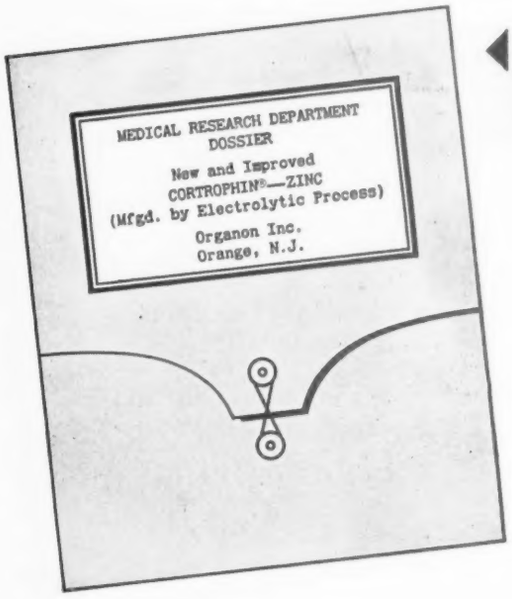

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Additional information is available to physicians on request.

1 Keesling, R., Hinds, E. C., and Keats, A. S.: Principles of Drug Evaluations in Dental Surgery: Antihistamines and Analgesics: (Paper read at the Thirty-fifth Gen. Meeting of the International Assoc. for Dental Research: Atlantic City, March 21-24, 1957). 2 Orahovats, P. D., Lehman, E. G., Chapin, E. W.: Pharmacology of Ethyl-1-(4-Aminophenethyl)-4-Phenylisonipecotate, Anileridine, A New Potent Synthetic Analgesic: Journal of Pharmacology and Experimental Therapeutics, Vol. 119, No. 1 (January) 1957. 3 Stage, J. T.: Anileridine as an Anesthetic Agent: Journal of the Florida Medical Association 44:143-145 (August) 1957. 4 Keats, A. S., Telford, J., Kurosu, Y.: Studies of Analgesic Drugs: Anileridine Dihydrochloride: Anesthesiology 18:690-697 (September-October) 1957. 5 Riffin, I. M., Preisig, R., Wheaton, H. H., Landman, M. E., and Schwarz, B. E.: "A New Synthetic Analgesic, Anileridine," Scientific Exhibit, 106th A.M.A. Annual Meeting, New York; June 3-7, 1957.

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Northern California Society

The Northern California Society of Hospital Pharmacists met July 8 at the Contra Costa County Hospital in Martinez, California. Dr. O. Ottis Cobb, Chief of Pediatric Service at Contra Costa County Hospital, and former chairman of the Child Welfare Committee of Alameda and Contra Costa Medical Society, was the principal speaker. Dr. Cobb talked on "Childhood Accidents in Alameda and Contra Costa." The activities of the Child Welfare Committee were described as to the education of members and the public regarding accidents to children and the statistical study of accidents. Homogenous types of accidents were further studied and the usefulness of the Alameda and Contra Costa Poison Control Center and its twenty-four hour service to physicians was mentioned. A question and answer period followed.

Included also on the program was a brief report of the recent convention of the California Pharmaceutical Association by Margot Nichols.

Announcements were made including plans for future meetings. The program chairman, Mr. William Dudley, announced that the August meeting would be held at the U. S. Public Health Hospital with Dr. Kathleen Roberts as the principal speaker. She will discuss "Electrolyte Balance."

Dade County Society

The Dade County Society of Hospital Pharmacists met for the annual banquet on June 17 at the Biscayne Room of the McAllister Hotel in Miami. The affair was sponsored by McKesson and Robbins Company.

At the July meeting of the Dade County Society, an administrator from Jackson Memorial Hospital in Miami presented a talk on "The Hospital of the Future."

Southern California Society

The July 9 meeting of the Southern California Society of Hospital Pharmacists was held at the California Rehabilitation Center at Santa Monica, with President Joseph H. Beckerman presiding. Mr. Beckerman introduced the speaker, Dr. O. L. Huddelston, Medical Director of the Center. His topic was "Modern Trends in Rehabilitation and Physical Medicine." Dr. Huddelston gave a detailed account of the methods used at the Center, accompanied by slides. Dr. Huddelston also ran the film "Success Story" which showed the Center, the activities, and the treatment offered at the Rehabilitation Center.

Also included on the program was a report on the new antibiotic, Kantrex, which was presented by Mr. Melvin Orchen, assistant chief pharmacist at the Cedars of Lebanon Hospital.

Following other announcements and introductions of the staff from the Kaiser Foundation, refreshments were served.

Indiana Chapter

The regular quarterly meeting of the Indiana Chapter of the A.S.H.P. was held at the Sheraton French Lick Hotel, French Lick, Indiana on June 17 at 6:00 p.m. The meeting was held in conjunction with the Convention of the Indiana Pharmaceutical Association. A dinner was enjoyed by members and their guests prior to the business meeting.

The meeting was called to order by President William Wissman. Installation of officers was performed by Mr. Charles Schreiber. Officers for the coming year are: *President,* William Wissman, Fort Wayne; *Vice-President,* Frank Duncan, Elkhart; and *Secretary-Treasurer,* Mildred Wiese, Indianapolis, Ind.

A resume of Dr. Sperandio's written report on the national meeting of the AMERICAN SOCIETY OF HOSPITAL PHARMACISTS was presented. Of chief concern to the members were three changes in the Constitution and By-Laws of the ASHP.

General plans for the coming year were discussed. It was announced that the campaign for new members will continue in the coming year. Meeting plans for the entire year will be mailed to the membership at the earliest possible time. This will be followed by meeting notices for each meeting. It was announced that regional meetings will again be held this year.

Special guests at the meeting included Mr. and Mrs. Robert Heikowsky, President of the Indiana Pharmaceutical Association and Mr. and Mrs. Henry Heine, Secretary of the Indiana Pharmaceutical Association.

Utah Society

Mr. Charles H. Anderson of the Latter-Day Saints Hospital in Logan, Utah, was elected President of the Society at the group's recent annual dinner meeting held in Salt Lake City. Other officers elected include *Vice-President,* Charles E. Johnson, Veterans Administration Hospital, Ft. Douglas; *Secretary,* Nellie Vanderlinden, Latter-Day Saints Hospital, Salt Lake City; and *Treasurer,* William Washburn, Thomas D. Dee Hospital, Ogden.

The principal speaker at the dinner meeting was Dean David L. Hiner of the University of Utah College of Pharmacy.

Secretaries of ASHP Affiliated Chapters are urged to send reports of meetings to the national secretary promptly. Since the American Journal of Hospital Pharmacy will appear on a monthly basis, reports must be received within five days after the meeting in order to be included in the forthcoming issue. We urge you to send details of the activities of your chapter for publication in this column.

Further, any suggestions which members have with regard to expanding this column in the interest of Affiliated Chapters, will be appreciated.

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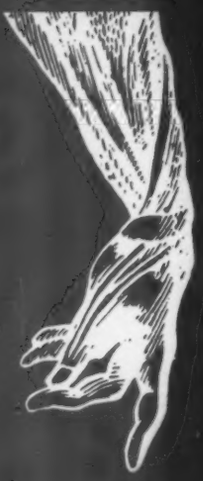

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PUBLISHED REFERENCES: 1. Carpenter, E. B.: Southern Medical Journal 51:627, 1958. 2. Forsyth, H. F.: J.A.M.A. 167:163, 1958. 3. Little, J. M., and Truitt, E. B., Jr.: J. Pharm. & Exper. Therap. 119:161, 1957. 4. Morgan, A. M., Truitt, E. B., Jr., and Little, J. M.: J. Am. Pharm. Assn., Sci. Ed. 46:374, 1957. 5. O'Doherty, D. S., and Shields, C. D.: J.A.M.A. 167:160, 1958. 6. Park, H. W.: J.A.M.A. 167:168, 1958. 7. Truitt, E. B., Jr., and Patterson, R. B., Proc. Soc. Exper. Bio. & Med. 95:422, 1957. 8. Truitt, E. B., Jr., Patterson, R. B., Morgan, A. M., and Little, J. M.: J. Pharm. & Exper. Therap. 119:189, 1957.

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Skeletal muscle spasm secondary to acute trauma	33	26	6	1	—
STUDY 2[2]		"pronounced"			
Herniated disc	39	25	13	—	1
Ligamentous strains	8	4	4	—	—
Torticollis	3	3	—	—	—
Whiplash injury	3	2	1	—	—
Contusions, fractures, and muscle soreness due to accidents	5	3	2	—	—
STUDY 3[5]		"excellent"			
Herniated disc	8	6	2	—	—
Acute fibromyositis	8	8	—	—	—
Torticollis	1	—	—	1	—
STUDY 4[6]		"significant"			
Pyramidal tract and acute myalgic disorders	30	27	—	2	1
TOTALS	138	104 (75.3%)	28 (20.3%)	4	2

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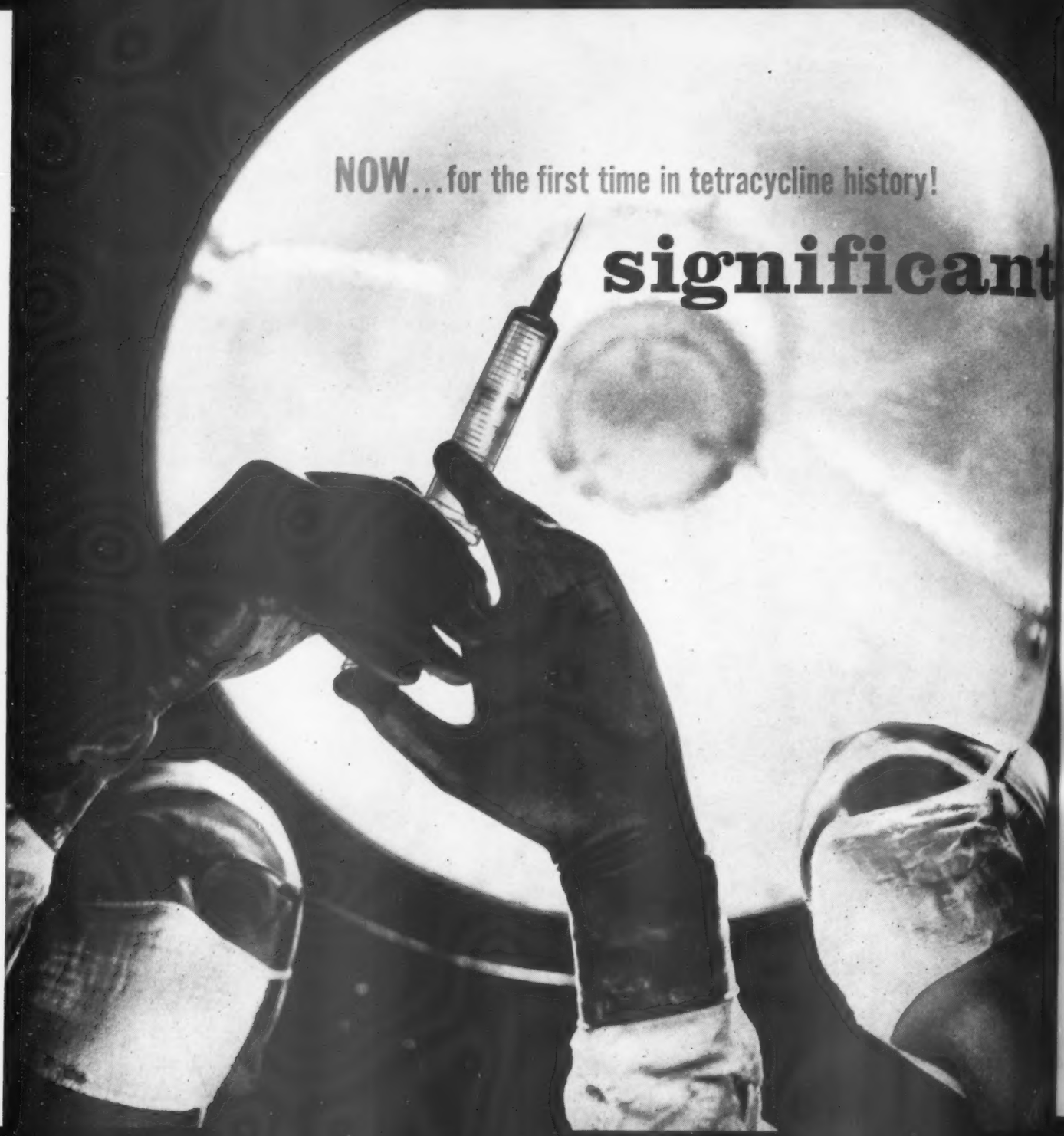

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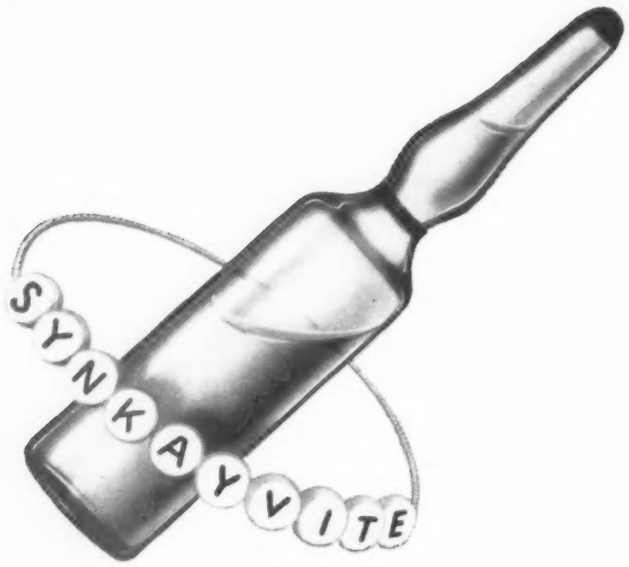

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Dear Sirs:

Radioisotope Course

DEAR SIRS: On behalf of the Oregon Society of Hospital Pharmacists, I wish to state briefly our progress in the field of radioisotopes. On May 26 we inaugurated one of the first courses in radioisotopes in the country for pharmacists.

Mr. Vernon Trygstad, director of pharmacy service of the Veterans Administration, visited our station in early May and our pharmacy staff expressed interest in radioisotopes. We have procured, scheduled, and paid for isotopes since May of 1957. Mr. Ernest Wilson, my chief, asked Mr. Trygstad about instruction in handling radioisotopes. Our director knew only of the Oak Ridge thirty-day course and suggested that we inquire on the West Coast.

I contacted Drs. Arthur Scott and Livermore, my ex-chemistry professors at Reed College, to discuss possibilities of establishing a radioisotope course. Such a seminar has been arranged which will cover fundamentals, calculations, and techniques of handling radioisotopes. This seminar has been designed to meet the stipulated training requirements for an "AEC By-Products Material License" and will be certified by Drs. Scott and Livermore.

I presented this seminar proposal at our hospital pharmacists' meeting on May 13 and was astonished at the enthusiasm displayed by the pharmacists present. At the end of the meeting, twelve pharmacists were enrolled. Our first class started May 26 with 18 pharmacists registered. I will send along an announcement of the seminar with this letter for your disposal.

Drs. Scott and Livermore have completed three of the six lectures scheduled and have provided a sound basis of fundamentals and principles of actual operation of detection instruments (Geiger Counter, Scintillation Detector and Lauritsen Electroscope).

I believe this seminar is one of the first radioisotope courses for pharmacists in the country and is the right step forward increasing our scope of professional knowledge, increasing our professional standing in the community, and providing more adequate service to the medical profession.

Our experience thus far has indicated that a wealth of knowledge will be gained. Perhaps this program will be of interest to you and may help you in establishing seminars of this nature for other chapters of the SOCIETY in the future.

JAMES B. LOW, *Past President*

Oregon Society of Hospital Pharmacists
3972 N. Colonial Avenue
Portland 12, Oregon

Reprints Requested

DEAR SIRS: I would very much appreciate receiving two copies of the article entitled "Needs for Hospital Pharmacists in the United States, 1957 Through 1970," by George F. Archambault.

. . . this material should be of great interest in our teaching program.

DANIEL L. DROSNESS, *Assistant Professor in Hospital and Medical Administration*

University of Pittsburgh
Graduate School of Public Health
Pittsburgh, Pennsylvania

Resolutions Received

DEAR SIRS: We wish to acknowledge receipt of your letter of May 20 calling our attention to the resolution which was adopted at the 1958 Annual Meeting of the AMERICAN SOCIETY OF HOSPITAL PHARMACISTS regarding safety programs in poison control.

Because of the work our Committee is now doing in regard to labeling of hazardous chemicals, we appreciate the interest the AMERICAN SOCIETY OF HOSPITAL PHARMACISTS has shown in this matter.

BERNARD E. CONLEY, Ph.D., *Secretary*

Committee on Toxicology
American Medical Association
Chicago, Illinois

DEAR SIRS: I appreciate very much your letter of May 20 incorporating the resolution passed at the SOCIETY's Annual Meeting with regard to H.R. 6801. I am very glad to know of the endorsement of the SOCIETY of the provisions of H.R. 6801, introduced by me and pending before the House Armed Serivces Committee.

CARL T. DURHAM

Congress of the United States
House of Representatives
Washington, D. C.

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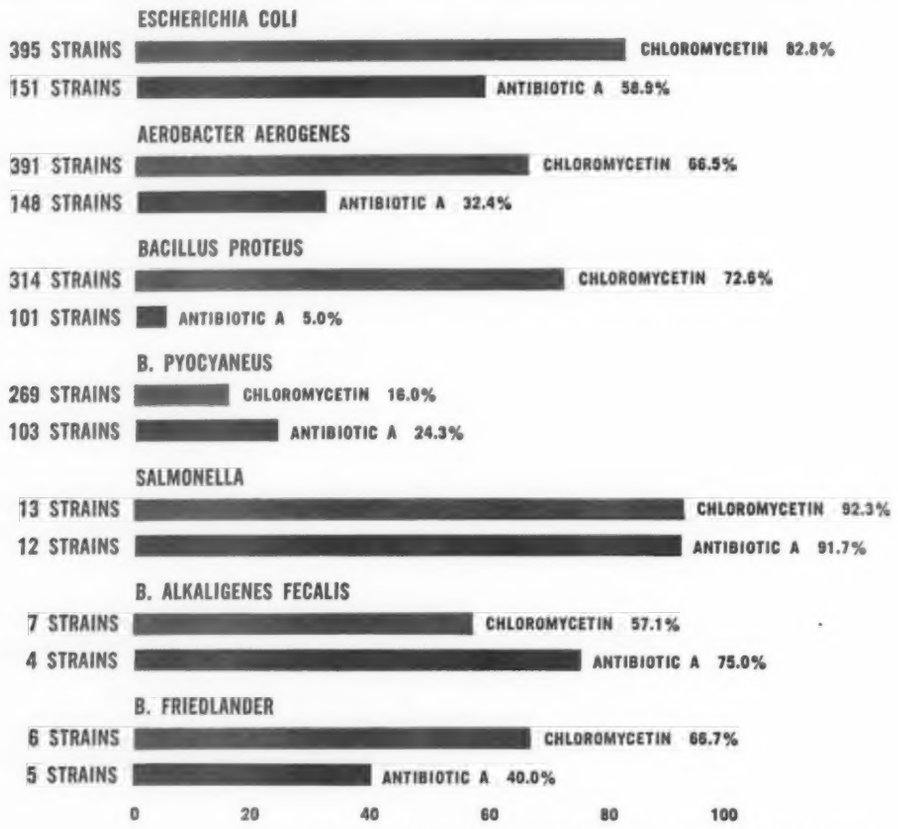

*Adapted from Schneierson, S. S.: *J. Mt. Sinai Hosp.* 25:52 (Jan.-Feb.) 1958.

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MEDICAMENTA VERA

editorial

by DON E. FRANCKE

Organizational Needs of the Society III: Active Members

► CERTAIN QUESTIONS EXIST IN THE INTERPRETATION OF THE DEFINITIONS OF *Active* and *Associate* members. According to Article 1, Section 3, of the Constitution "A hospital pharmacist shall be defined as any legally qualified pharmacist currently practicing the art and science of pharmacy in a hospital or clinic, or actively engaged in the administration, planning, or supervision of pharmaceutical procedures in hospitals or clinics."

When one thinks of an active member of the SOCIETY he usually thinks of a pharmacist employed full-time in a hospital or clinic as a staff pharmacist or in a supervisory capacity. However, the last portion of the definition quoted above permits the inclusion of other pharmacists in the category of active members. For example, officers and personnel in health organizations related to hospital pharmacy, such as the American Pharmaceutical Association, the AMERICAN SOCIETY OF HOSPITAL PHARMACISTS, the American Hospital Association, etc. can with great justification be said to be actively engaged in the planning of pharmaceutical procedures in hospitals. And, often these organizational pharmacists make significant contributions to hospital pharmacy practice. The same may be said of those hospital pharmacists who may be assigned to planning for civil defense, poison control centers, health insurance programs, or other areas related to health.

Some faculty members of colleges of pharmacy are eligible for active membership in the SOCIETY, for example, the dean or faculty member who is in charge of a student health clinic. On the other hand, a faculty member who teaches a course in hospital pharmacy would not, for that reason alone, be eligible for active membership.

Today, many former hospital pharmacists hold posts as administrators, assistant administrators, etc. of hospitals. Since most of these individuals have the pharmacy as one of their areas of administrative supervision, they are "actively engaged in the administration, planning, or supervision of pharmaceutical procedures in hospitals or clinics." They therefore undoubtedly qualify for active membership.

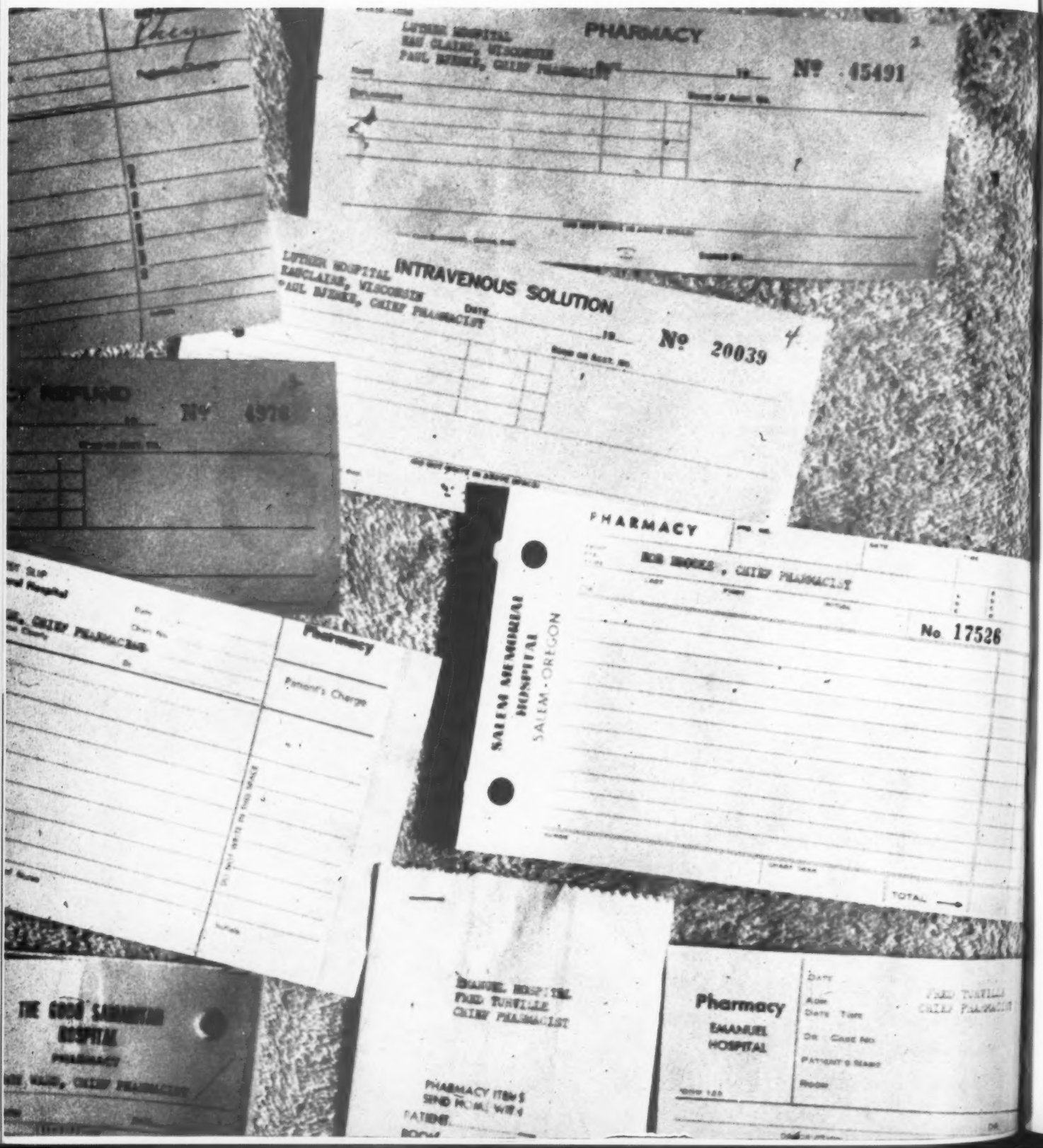
The question of a pharmacist who practices on a part-time basis in a hospital or a clinic is not covered specifically in the present By-Laws. Presumably, community pharmacist, a member of a college faculty, or any other pharmacist who serves a local hospital or clinic on a part-time basis is eligible for active membership. This interpretation is implied in the *Elaboration of the Minimum Standard for Pharmacies in Hospitals* where it states " In smaller organizations in which a pharmacist cannot be utilized on a full-time basis even with related collateral duties, a qualified pharmacist should be employed for a portion of each day." Considering the present and future pharmaceutical needs of small hospitals, the potential is great for a very large number of members who serve hospitals on a part-time basis. Conceivably, this group could almost equal or even exceed the number of hospital pharmacists employed on a full-time basis. Thus, the time could arrive when a group whose principal interest is outside of the hospital could formulate the policies of the SOCIETY if the present interpretation of active member is maintained.

The term "legally qualified pharmacist" raises some question of interpretation. Pharmacists employed by agencies of the Federal government are not required to be licensed in the state in which they practice, but, rather, must be licensed in one of the forty-nine states or the District of Columbia. While one normally thinks of a legally qualified pharmacist as being licensed in the state in which he practices, the SOCIETY has, without exception, accepted as active members those in government service who are licensed in any of the states.

"When an active member so changes his vocation as to no longer fit the definition of a hospital pharmacist, he shall automatically become an associate member . . ." according to Chapter V, Article 3 (a) of the By-Laws. Some who have entered the SOCIETY as active members have voiced strong disapproval of the provision stating, in effect, that a physician remains an active member of his national professional organization no matter what type of position he may accept. The difference, it seems to this writer, is that membership in the American Medical Association must be compared to membership in the American Pharmaceutical Association and not to that in the AMERICAN SOCIETY OF HOSPITAL PHARMACISTS which is a society composed of specialists. All pharmacists are eligible for membership in the American Pharmaceutical Association but only those associated with practice in hospitals are eligible for active membership in the ASHP.

In practice, it is difficult to maintain a completely accurate list of active members because members who should be changed from active to associate status do not notify the SOCIETY's officers and a check on the individual's status can be made only once a year when his dues are paid.

Streamline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No 17526
Pharmacy
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your record system!

by Frank Hollister

Use of addressograph plate on all records helps to prevent errors

► RECENTLY, BY MEANS OF A LIMITED SURVEY, I found that very few hospital pharmacists had any original improved methods to suggest regarding their record systems. This would indicate that basically we have been content to make minor improvements on existing forms. We justify our actions by consoling ourselves with the belief that our system may be simple but it is adequate. This is a very convincing conclusion to make, for undoubtedly the basic rule in the development of any record system is simplicity. Of course, there are many reasons for this lack of interest in our record department, but the fact that it does not constitute a professional duty is the major one for most of us. As hospital pharmacists thinking in terms of our professional duties, we consider only material improvements such as new equipment to add to our manufacturing departments or perhaps the expansion of our pharmacy to include central supply, and our decadent record system remains *status quo*.

It has been estimated that hospitals account for from 25 to 30 percent of the total market for prescription legend drugs.[1] Many of us manage pharmacy departments which exceed the dollar volume of the largest retail prescription pharmacies in our community. However, I am certain that the retail pharmacist, if he is a successful one, does not consider his record system as secondary to his professional duties. This, too, may be the difference between the success and failure of our own operation.

FRANK HOLLISTER is Assistant Chief Pharmacist, U.S. Public Health Service Hospital, New Orleans, La.

Presented at the Institute on Hospital Pharmacy, Seattle, Wash., June 1957.

It is with the foregoing thought in mind that I have prepared this paper, in the hope that some of the suggestions that follow might be utilized to improve your present pharmacy record systems. For the purpose of illustration I shall divide hospital pharmacy records into the following categories:

1. Patient orders
2. Floor stock orders
3. Purchasing and Stock Control
4. Prescriptions
5. Pricing
6. Manufacturing and Labeling
7. Narcotics

Patient Orders

One of the most recent advances in patient ordering is the adoption by many hospitals of the Addressograph system. The Addressograph plate is prepared by the Admitting Department for each patient and this accompanies the patient's chart. This system has many advantages to the hospital pharmacist in that factors which influence dosage, such as the patient's age, sex, diagnosis, weight, etc., can be transferred to the patient order form in one easy operation. Also, the system prevents potential errors in the listing of names and room numbers on the order forms. Codes may also be utilized to indicate the insurance status of the patient and to identify house cases. This, of course, permits the pharmacist to use the proper billing procedure. Obviously, the merit of such a system to the pharmacy department alone does not justify the implementation of such a costly process. However, such a procedure is equally beneficial to many other departments and it is felt that the pharmacist is in a position to influence its adoption.

Patient order forms have been pretty well standardized throughout most hospitals. All contain space for the basic information required for proper accounting procedures and, with little variation, the balance of the form is devoted to space for drugs and the charge. This same form printed in different colors can be utilized for credits, house cases, outpatients, and for other uses where segregation is required.

Bronson System Form

A recent improvement in the patient order system was developed by Mr. Leo Godley during his tenure as Chief Pharmacist at Bronson Methodist Hospital in Kalamazoo, Michigan.[2] The Bronson system utilizes one form as a multiple prescription order for as many as 135 requests during the patient's hospital stay. This clearly offers many advantages to the business office by reducing the average drug postings from approximately eight to only one order per patient stay. There is space on the order form for a total of 25 or more different prescriptions and a simplified re-order system for each prescription.

Each time the drug is re-ordered the date, amount, and charge is entered by the pharmacist. The pharmacist, with a complete listing of all the drugs previously ordered for the patient before him, can thus prevent duplications, varied charges and dosage errors. The nurse's ordering is simplified by the re-order system as it is merely a matter of indicating a number in one of the control squares. As this order is filled by the pharmacist the request number is stricken.

There is also space on the form for interim billing, credits, emergency drug cupboard orders, drugs stocked on the floor, and intravenous infusions. The form may then be kept on file after the patient is discharged and becomes a complete prescription history for that particular patient for ready reference.

Bronson system utilizes one form as a multiple prescription blank

Use of microfilming is inexpensive and time-saving

Microfilm Recordak

While microfilming is not by any means a new process its use in hospitals has been limited primarily to the record library. It would seem that the advantages of this simplified and inexpensive means of recording and filing are not fully utilized. Physicians and Surgeons Hospital in the city of Portland, Oregon uses a photographic billing system which is exceedingly simple and saves a great deal of time and space. Essentially the system operates in the following manner:

1. As the patients' charge slips are received by the business office they are filed for a period of one week or until the discharge date.
2. A weekly tape total is made and this figure is entered on the bill.
3. Each group of charge slips is then identified by a number and microfilmed. About 25,000 slips are contained in a single 100 foot roll.
4. The patient charge slips are stapled to the patient's bill which then becomes an itemized account for the patient when discharged.

A four-year accumulation of charge slip records is stored on two shelves of the small safe in this 140 bed hospital. Also, this system eliminates the need for expensive billing machines and trained operators. If your hospital does not have a centralized billing system. such a procedure could be easily incorporated within the individual department. There are undoubtedly many other applications of this microfilming process that could be used to simplify our record systems.

Floor Stock

Floor stock order forms also are fairly well standardized. Some hospitals use the same form for floor stock and patient orders while other utilize standard order pads for floor stock ordering. A current trend in many hospitals has been to make a consolidated list of all authorized floor stock in the form of a check order sheet. This simplifies the nursing station order procedure to merely listing the quantity of each item required. The pharmacist using this system can prepackage orders as indicated on the form. The form can then be priced and totaled for proper posting in the business office. Also, the nurse in charge of medications has a complete listing of all authorized floor stock. If the item required is not listed on the order sheet it automatically requires a patient order slip to obtain it.

Prices are readily seen on The Flexoline System

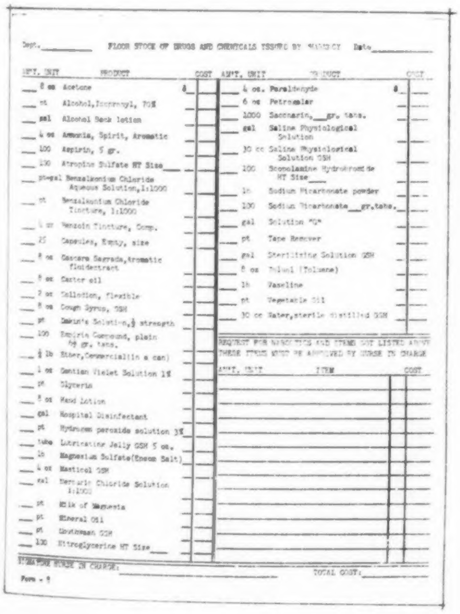
Purchasing and Stock Control

There are many standard forms and record systems available for stock control and this is one phase of the pharmacy record system where we do not have to rely on our own ingenuity. For a convenient complete master file of the entire pharmacy inventory the Acme Flexoline revolving file is perhaps one of the simplest and most practical methods of solving this problem. This file can be used as quick reference to locate the product by physical location within the department as well as a price guide and complete listing of all items and dosage forms carried in stock. Thin wood veneer, paper covered strips are supplied in sheets that can be inserted in the typewriter. Any change in price or additions to the stock can be quickly and conveniently added to the file. One Flexoline system will provide space for as many as 100,000 single line listings in alphabetical order. The Acme Co. also has a very efficient stock control system which warrants consideration.

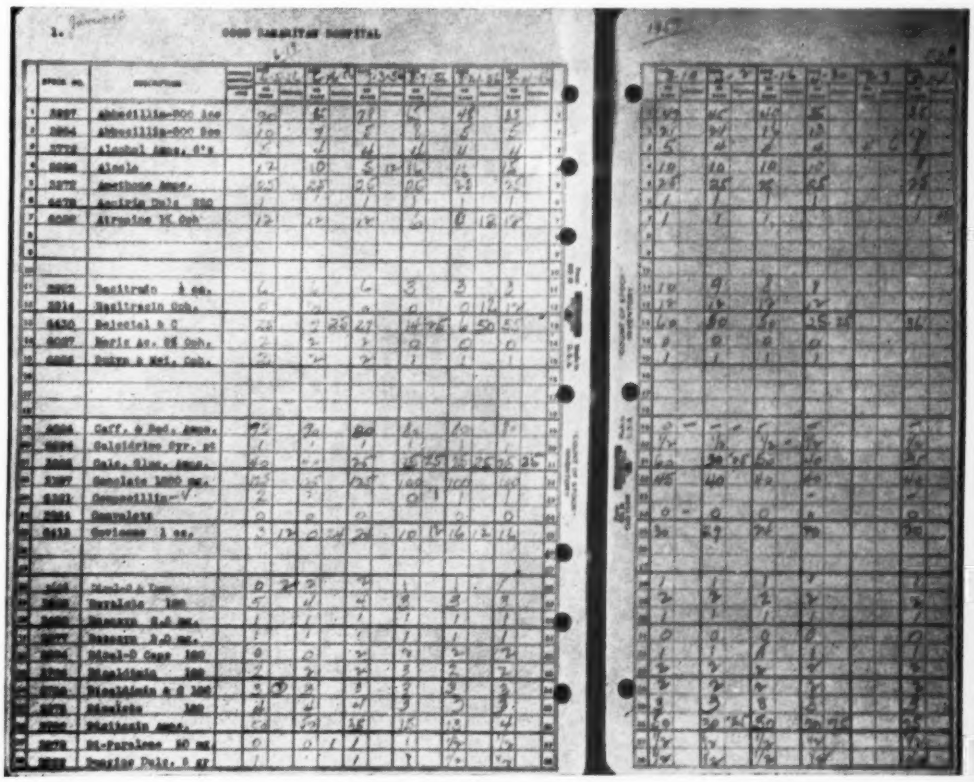
Stock Record Form RR-38

Another standard form which has many applications in the process of stock control is the National Stock Record Form No. RR-38 and the supplemental sheet form RR-39. This is a standard form available through office supply or stationery suppliers. Each form has space for 38 items and a column for stock number designation. There is also a column provided to list the average monthly or weekly consumption. The inventory section provides space for the date, quantity on hand, and quantity ordered. The supplemental sheet contains twelve additional inventory columns and provides a convenient means of extending the inventory space without having to relist item description. The forms are perforated to fit a three ring binder and are reinforced with copper.

If it is the policy of your pharmacy to permit the pharmaceutical representatives to inventory their own stock, then by all means it is advisable to provide them with this form. This insures a complete inventory of all items listed and will provide you with a perpetual record of purchases and consumption. The system can



Simplified ordering is provided by standardized floor stock forms



Stock record forms RR-38 and RR-39 help to maintain accurate inventory controls

be utilized in the same manner by the pharmacy staff if the representative is not permitted to inventory and, though it may be somewhat time consuming, the results will pay dividends.

Other uses for which the form might be utilized include the pharmacy narcotic inventory, annual physical inventory of the entire department stock, inventory of narcotics and floor stock supplies signed out to nursing stations, and as a perpetual inventory system for night emergency drug stock. There are, of course, many other applications and those mentioned are just a few examples.

Relatively simple forms may be used for purchasing and credits

Purchasing

It makes little difference what type of form is used for direct purchasing as long as it meets the requirements of the accounts payable department within your hospital. However, it is important that some sort of purchase order form be utilized. At least one copy for your own records is required, as the original becomes the property of the vendor. This order is, of course, an agreement between the vendee and vendor and thereby becomes a basic document to protect the price quotation, and any other terms of purchase indicated on the form after it is accepted by your representative. A purchase order should also have an identification number so that the vendor can identify your order on the invoice. This again simplifies the system of checking merchandise received against the invoice and purchase order. A duplicate invoice may be requested with daily orders received from the wholesaler and thus eliminate the necessity of making out a purchase order for these items. The duplicate invoices will provide the record for the items as requested.

Prescriptions

The prescription form itself has to comply with certain state and federal requirements as to the information required and, therefore, has become a standardized document. So the problem that concerns us is not one of form simplification but proper filing facilities. It has long been the problem of both the retail pharmacist and hospital pharmacist alike to find a convenient, inexpensive, and simplified system of filing prescriptions where they are readily accessible for reference. Then too, the storage problem has always been a matter for concern particularly where large numbers of outpatient prescriptions are filled.

Mr. Leib Riggs, who owns the Riggs pharmacies in Portland, Oregon has recently developed a prescription filing system which has many of the aforementioned advantages. The Riggs System consists of binding the prescriptions in volumes of 500 by means of a pressed fiberboard cover and using a cloth

gummed backing. The prescriptions, loosely tied by means of a heavy yarn material similar to that used in the manufacture of rugs, permit the prescription book to remain open at the desired reference number. The books are then filed in a four by six inch dual file and will permit convenient storage of 10,000 prescriptions per drawer. Each volume is identified by the inclusive numbers written with a felt pen across the cloth backing.

Verifax Copies

If a duplicate prescription file is required for use in an outpatient division of your pharmacy, the Verifax copier might be the answer. The prescriptions are first placed on the Verifax sheet in multiples of four. This is then slipped into the activator section in the base of the copier. Then, after a period of 20 seconds, the copy paper is withdrawn and the prescriptions are reproduced. Such a copier may also be used to reproduce letter, invoices, or other records for your files.

Pricing

There are undoubtedly as many prescription pricing methods as there are hospital pharmacies, for even though we may in some cases use the same schedule it is invariably modified to conform to our own pricing policies. In most instances we are almost compelled to follow the pricing pattern of the retail pharmacist in our community. Thinking in terms of a simplified, realistic, retail schedule, many hospitals on the Pacific Coast and in the Western states have adopted what is known as the Pacific Drug Review Prescription Pricing Schedule.[3]

The Pacific Drug Review Schedule is a periodically revised pricing guide that has been in use since 1932 and, therefore, presents a time-proven schedule based on current operating costs. The schedule, using the tabular system as a pattern, has as its base the cost of a drug per 100 in the case of tablets or capsules, or per pint for liquids, and per pound for ointments. There are other simplified schedules included that may be used for compounded solutions, powders, and ophthalmic preparations. The schedule is approximately 10 by 14 in size and laminated for durability, thereby presenting a very convenient and compact uniform pricing reference. The latest revision of this schedule was released for distribution in May of this year by the Pacific Drug Review.*

If you are confronted with the problem of uniformity in pricing those items which have a fixed price, such as packaged units of wets and drys and vitamins, then the previously mentioned Flexoline file may be the answer. This file may also be used to list the uniform cost prices per hundred, pint, etc., when utilizing a schedule such as the Pacific Drug Review. Also, the cost per unit of floor stock may be listed so as to avoid variables in pricing these items.

Riggs filing system permits storage of 10,000 prescriptions per drawer

Prescriptions may be rapidly reproduced using the Verifax

A simplified method of marking merchandise as it is checked in consists of the use of self-adhering Senso price labels. You can list first the date by numerical month number, then the price, and this is followed by the last numeral of the year. Thus if you have an item which costs $3.25 and it was purchased in June of this year, the price label would read 6 325 7. This system of checking in merchandise also offers the advantage of a simplified stock control system as the package always carries the approximate date purchased. Also, the price loses its identity to the general public without resorting to an inconvenient letter pricing code.

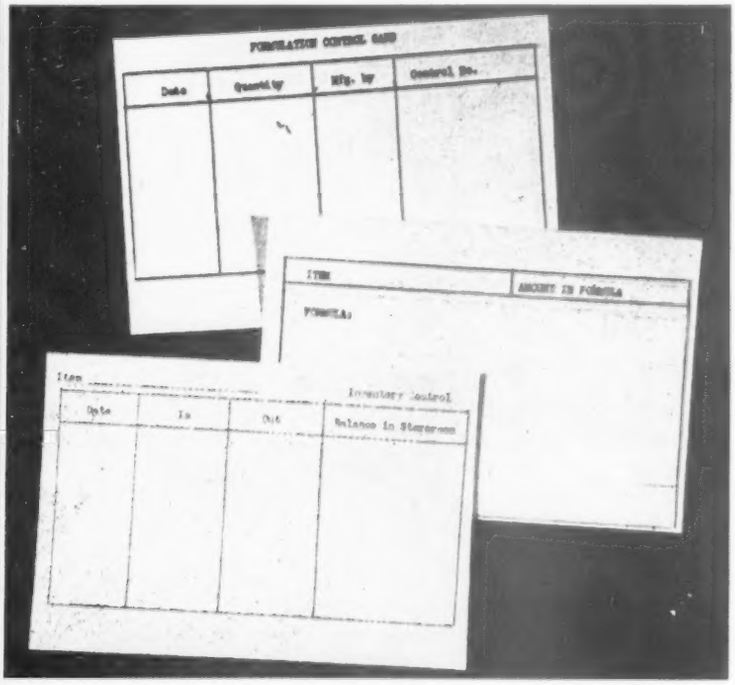
Manufacturing and Labeling

There are many forms that have been developed for use in a manufacturing program and essentially they are all designed to serve one purpose, and that is product control. It therefore follows that if you are operating a large manufacturing department within your pharmacy, which includes the preparation of intravenous infusions, your record system will, by necessity, be more complex than one required for simple bulk compounding on a small batch basis. In either case there are essential records that should be kept.

The first record that one should consider for manufacturing control is some sort of formulation card or sheet. Such a record can be easily reproduced on a 3 x 5 file card, one side being used for the formula and directions and the opposite side utilized for a production record. The production record should contain the date, control number if used, identity of compounder, and total quantity prepared. The facts from this card may then be used to compile a monthly manufacturing report to your administrator.

Another important record is the manufacturing worksheet. This form should contain complete formulation listing, the calculations, a check section for verification of the calculations by a second party, formula, ingredients, and weights. If your pathology laboratory has the facilities to complete your control tests, such as sterility and chemical analysis, then most likely they will be able to provide the necessary forms for this phase of your manufacturing program. In any case, some record must be maintained regarding these tests as proof of an acceptable product.

Though labels and labeling perhaps in a strict sense do not fall in the realm of pharmacy records there is one new development in labeling that deserves comment. The new pressure sensitive labels being

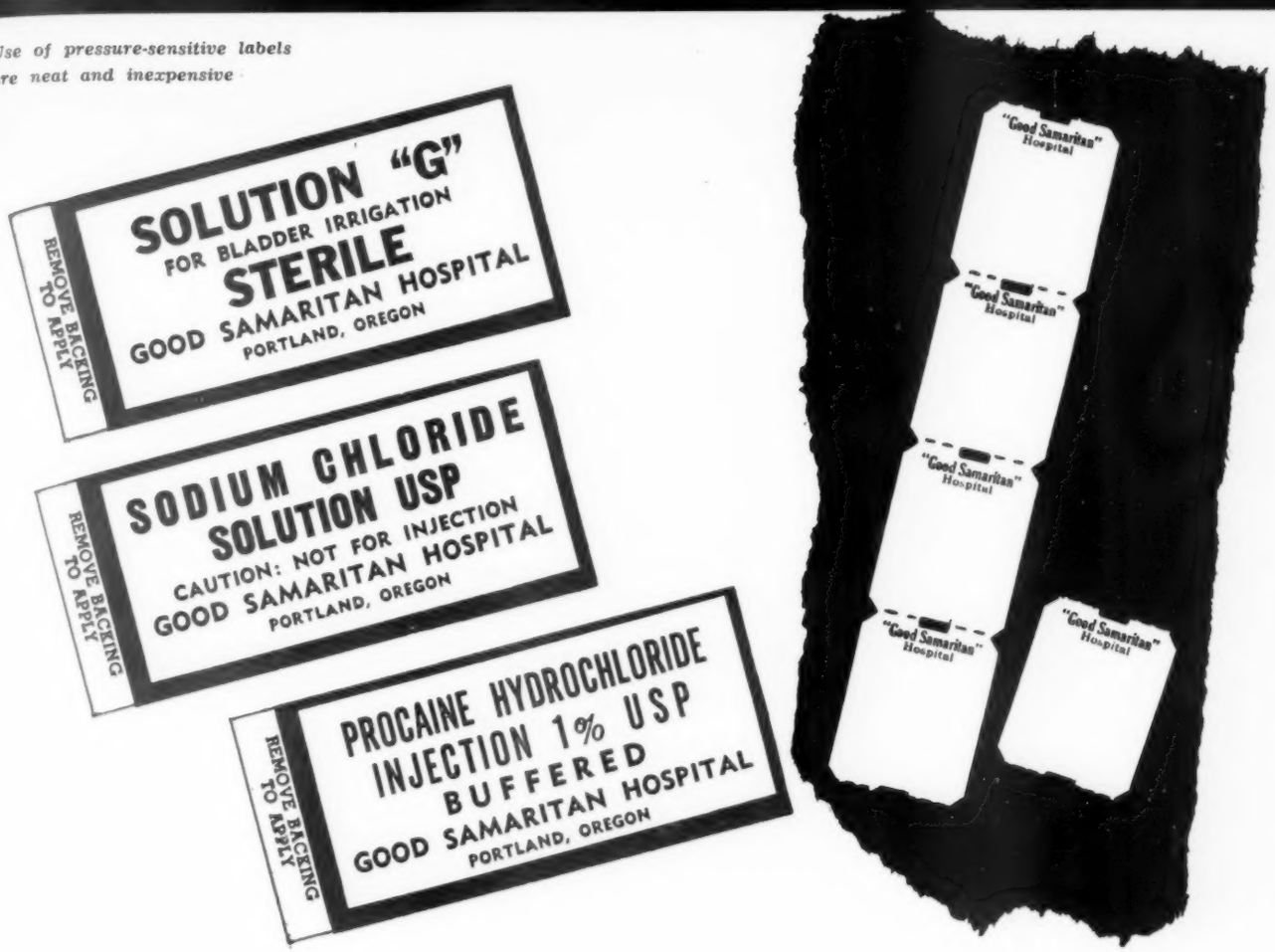


Manufacturing procedures require certain basic records

MANUFACTURING WORKSHEET		Station	
Preparation		Date Prepared	
Source of Formula		Quantity	
Ingredients	Quality	Amount	Remarks
Approximate time to complete preparation			
Calculations and Proof			
Checked by: _____Calculations _____Formula		_____Ingredients _____Weights	
Prepared by:			
Alcohol used		Checked by	
Narcotics used		Control numbers	

Manufacturing worksheet serves as control for products prepared in the pharmacy

Use of pressure-sensitive labels are neat and inexpensive



produced offer to the hospital pharmacist a neat appearing, inexpensive label that will withstand the moisture and temperature of autoclaving many times. The labels may be printed in the same manner and shape as those used normally, but differ in that they contain self-adhering adhesive on the backs with a protective seal covering it. These labels cost very little more than the ordinary custom prepared label and are extremely useful in the proper labeling of solutions which require autoclaving.

Narcotic Forms

For several years the AMERICAN SOCIETY OF HOSPITAL PHARMACISTS has studied the problem of narcotic control in hospitals. Results of this study culminated in the publication of a comprehensive report which included detailed requirements for the control of narcotics in hospitals. This article, "Suggested Regulations for Handling Narcotics in Hospitals," by Arthur W. Dodds, appeared in *The Bulletin of the American Society of Hospitals*. The forms recommended for narcotic control are discussed in this article. These forms have been sanctioned by the Bureau of Narcotics.

Two other articles concerning the use of narcotic forms have appeared recently. In his article, "The Law of Hospital Pharmacy," Dr. George F. Archambault has discussed numerous aspects of the Harrison Narcotic Act.[4] Also, Archambault and Dodds reviewed problems concerned with the control of narcotics in hospitals in an article which appeared in *Hospital Management* in 1957.[5] Even though you may feel that your present narcotic control system is adequate, it will pay you to review these papers. The federal regulations are reviewed thoroughly and many disputed points are clarified.

Conclusion

Proper management of the pharmacy department is one of the principal functions of the modern hospital pharmacist. Good records are the keystone of good management. We hope that some of the suggestions offered in this paper will stimulate hospital pharmacists to review and improve their record systems.

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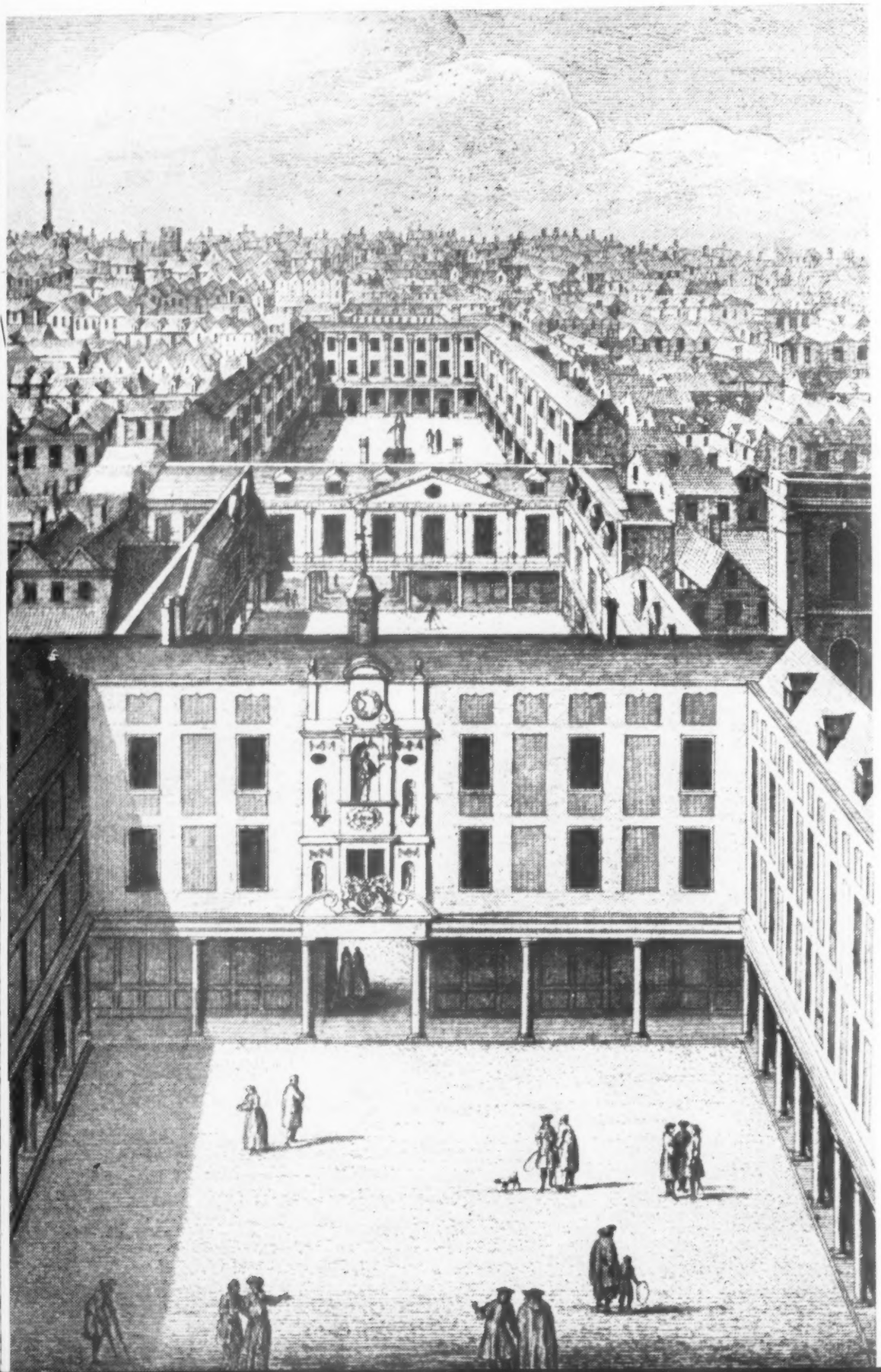
*Available for the price of $1.00 from the Pacific Drug Review, Woodlark Bldg., Portland, Oregon

THE HOSPITAL FORMULARY

St. Thomas's Hospital during the 18th Century



OF ROBERT POOLE

(1708-1752)

by ALEX BERMAN

► SIGNIFICANCE OF POOLE'S FORMULARY

Historically, the *Physical Vade Mecum,* or *Fifth Gift* of Robert Poole, alias Theophilus Philanthropus, is the second link in a chain of London formularies initiated by Henry Banyer in 1718.[1] The four editions of Banyer's *Hospital Dispensatory* which appeared between 1718-1739 were followed by Poole's publication in 1741, then by the anonymous works called *The Modern Practice of the London Hospitals* during the second half of the 18th century, and finally by the successive compilations of formularies of the London hospitals by Peter Squire and his sons between 1863 and 1891. All these formularies sought to present the collective prescriptions of most of the leading hospitals of London.

There are two important aspects of Poole's work: 1. The remarkably detailed discussion of hospital administration and policy as practiced at St. Thomas's; and 2. The presentation of prescriptions and their therapeutic application in St. Thomas's, Guy's and St. Bartholomew's.

Life and Work of Robert Poole

In the Preface to his formulary, Poole wrote "after some years attending the Academy of Liberal Arts and Sciences under the most Learned, Worthy and Pious Professor Eames, various Courses of Anatomy by the Incomparable Dr. Nichols, Professor of Anatomy at Oxford; and of Chymistry, by the Ingenious Dr. Pemberton, Professor of Physick at Gresham College, I entered myself Physician's Pupil at St. Thomas's Hospital on the 2d of March 1738, in order to acquire the Knowledge of the practical Part of Physick, which I have ever since attended with as much Care and Diligence as I was able . . ."

ALEX BERMAN, Ph.D., is Assistant Professor of Pharmacy, College of Pharmacy, University of Michigan, Ann Arbor.

This paper was supported in part by a research grant from the AMERICAN SOCIETY OF HOSPITAL PHARMACISTS and Lederle Laboratories.

Presented before the Section on Historical Pharmacy of the American Pharmaceutical Association, Los Angeles, April 25, 1958.

In 1741, Poole made a trip to the University of Rheims, where after a single day's examination he obtained an M.D. degree.

A bachelor of independent means, he has been characterized in one biographical source as "a most industrious student and an indefatigable taker of notes," who "During his hospital studies busied himself with religious exhortation and distributing good books."[2] Poole must have appeared as an intolerable nuisance to some of his contemporaries, and on at least one occasion copies of his theological works were "publicly burnt in Anne's Ward in St. Thomas's Hospital."[3]

Poole's writings are permeated with fanatical religiosity. Of six publications, referred to by him as "Gifts," the first four and the sixth were religious tracts; these and the *Physical Vade Mecum* or *Fifth Gift,* the work under discussion, were all released under the pseudonym of Theophilus Philanthropus.

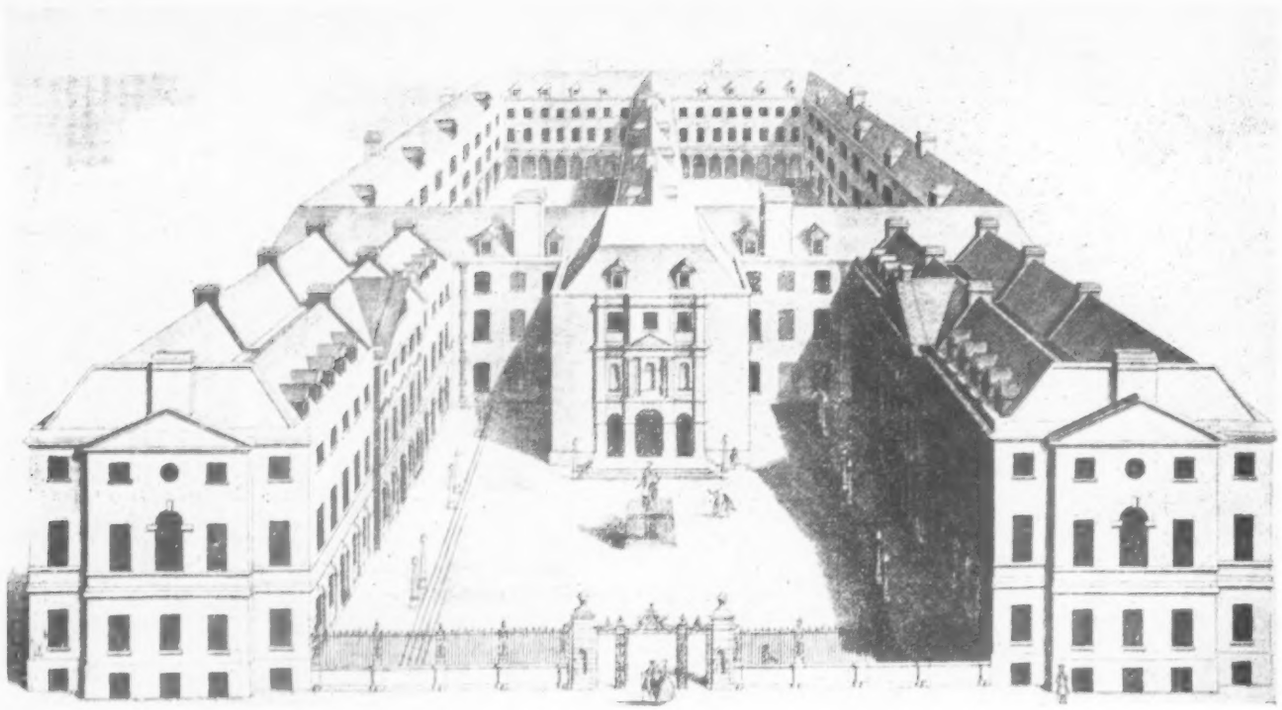
Using his own name, Poole also wrote several books on travel, and a work entitled *The Chymical Vade Mecum : or, A Compendium of Chymistry,* London, 1748. This latter work contained a preface full of piety and preaching, followed by a discussion of chemistry which the author frankly admitted was "chiefly extracted from the painful Labours of the late and judicious and ingenious Boerhaave."[4]

Hospital Administration and Policy at St. Thomas's

Poole's *Physical Vade Mecum* opens with a long "Dedication" whose main thesis is that "There is too much reason to fear, that our Hospitals are for the Generality, nearly filled with Heathens."

Having unburdened himself in an 18-page exhortation which included a violent blast at "the common harlots . . . that infest our streets and Lanes of the City," the author then proceeds to the Preface, which constitutes a most extraordinary and valuable documentary source for the historian of medicine and pharmacy.

The 54-page preface deals with the following subjects:



Guy's Hospital as it appeared about 1734

1. The physical facilities of St. Thomas's hospital.
2. The Governors of the hospital.
3. The activities, responsibilities and functions of the medical administrative staffs, as well as the nursing and custodial help.
4. Policy and method in admitting inpatients and outpatients.
5. Procedure and policy in dispensing drugs.
6. Procedure and policy in the wards, including regimen of patients.
7. Visiting the wards by the physicians.
8. The days and hours during which the physicians visit and prescribe for patients in the wards.
9. Statistical breakdown on the number of patients admitted during a two-year period.
10. Financial statistics on the expenses of the hospital including salaries of personnel.
11. Sources of revenues of the hospital.
12. The printed rules of the hospital.

It may be appropriate at this point to quote some of Poole's observations, for example, his description of the Apothecary's Shop:

> . . . a very neat, pretty Place, of about 39 Foot 3 Inches long; 16 Foot 2 Inches broad at the West End, 16 Foot 8 Inches at the East End which is well stored with Medicine for the Use of the Hospital; besides which is ornamented by the Apothecary, who is a very judicious, Prudent, Curious and Ingenious Gentleman, by a Museum or Cabinet of various Curiosities; another with a beautiful Collection of the *Materia Medica*, and a large handsome fram'd Skelleton placed over the same, with other Decorations, or Ornaments.
>
> "Under this Shop," continues Poole, "is a neat Cellar, pav'd at bottom with broad Stone, for repositing Medicine . . . adjoining to which Southward upon the same Floor, parted by a Partition, is the Laboratory, about 47 Foot 9 Inches long, and 25 Foot 5 Inches broad, paved at bottom, with broad Stone. . . this is likewise a most convenient Place, well furnished with Conveniences for preparing of Medicine for the Use of the Shop, as Occasion requires."

The three physicians and three surgeons who were appointed to the hospital did not reside on the premises, but the Apothecary was granted an apartment in the hospital for himself and his family which Poole describes as "a very neat handsome Place, well furnished with necessary Conveniences." The apothecary was considered as one of the "superior officers" of the institution along with the Ministers, Physicians, Surgeons, and Steward. Of the Apothecary, Poole writes: "The Apothecary is Mr. Pearce, who is a very industrious, worthy Gentleman, of exemplary Piety and Good-nature; diligent in his Calling, Judicious in his Conduct, Expeditious in his Business and faithful to his trust."

The author relates the manner in which medications were dispensed to outpatients according to directions in the doctors' order books rather than on the basis of separate individual prescriptions:

> The Books being brought from the Doctor's Room, are placed upon the Table or Repository of Medicine, which is prepared for this purpose, and provided with small brass castors or Wheels to move about at pleasure, and is well stored with various Sorts of Medicinal Compositions situated in Proper Order for the speedier dispensing of the same; which being in readiness, the Womens Book is first opened, when Silence is commanded, and Directions given to the Patients concerning their future Attendance; after which

their names are called one after the other, as they are entered in the Book, and as their Medicines are dispensed to them, Directions by Word of Mouth are given how to use them, but such as do not attend and Answer to their Names, have no Right at that Time to be served with Medicines because of their disregard to Order; yet such is the good Nature of the Apothecary, as often inclines to favour them herein, tho' to the no small Interruption of the Dispatch of his Business: After the Women and Children are all served, then the Men are called in. . .

Poole depicts at length the regimen of patients at St. Thomas's. He describes the activity in one 25-bed ward of the hospital as follows:

The Ward to which this Account relates has 25 Beds, and therefore may somewhat differ in respect to Coals and Candles from others that are larger or less; but in respect to other things they all agree; except the Salivating Wards, [i.e., wards where patients were given massive doses of mercury, either orally or by inunction] or those Patients under Salivation who are allowed no solid Victuals, but altogether confin'd to Liquids, as Water gruel, Milk Porridge etc., together with plenty of Beer, each Patient being allow'd a Pint an Hour in the Day, and half the quantity an Hour at Night, always drinking it warm; plentiful drinking and to keep from cold being highly expedient in order for a good Flux and Cure in such Circumstances.

As to the Time of delivering out the Drink and Food of the Wards, the Sisters are reminded hereof by the ringing of a Bell: At Eight o'Clock in the Morning the Kitchen Bell rings for setting the Score for Provisions for that Day . . . At Twelve o'Clock it rings again, for fetching of Patients Dining Provision: And at Nine o'Clock in the morning, and Four in the Evening, another Bell is rung for fetching of the Beer; when such Patients in each Ward as are able are requir'd to attend with their Leathern Jacks for the same. . .

The physicians of the hospital each received 40 pounds a year, the surgeons 49 pounds 6 shillings 8 pence each, and the Apothecary 50 pounds per year. Total salaries for all personnel amounted to about 1720 pounds. The amount of money spent by the Apothecary for the purchase of drugs for one year was 800 pounds.

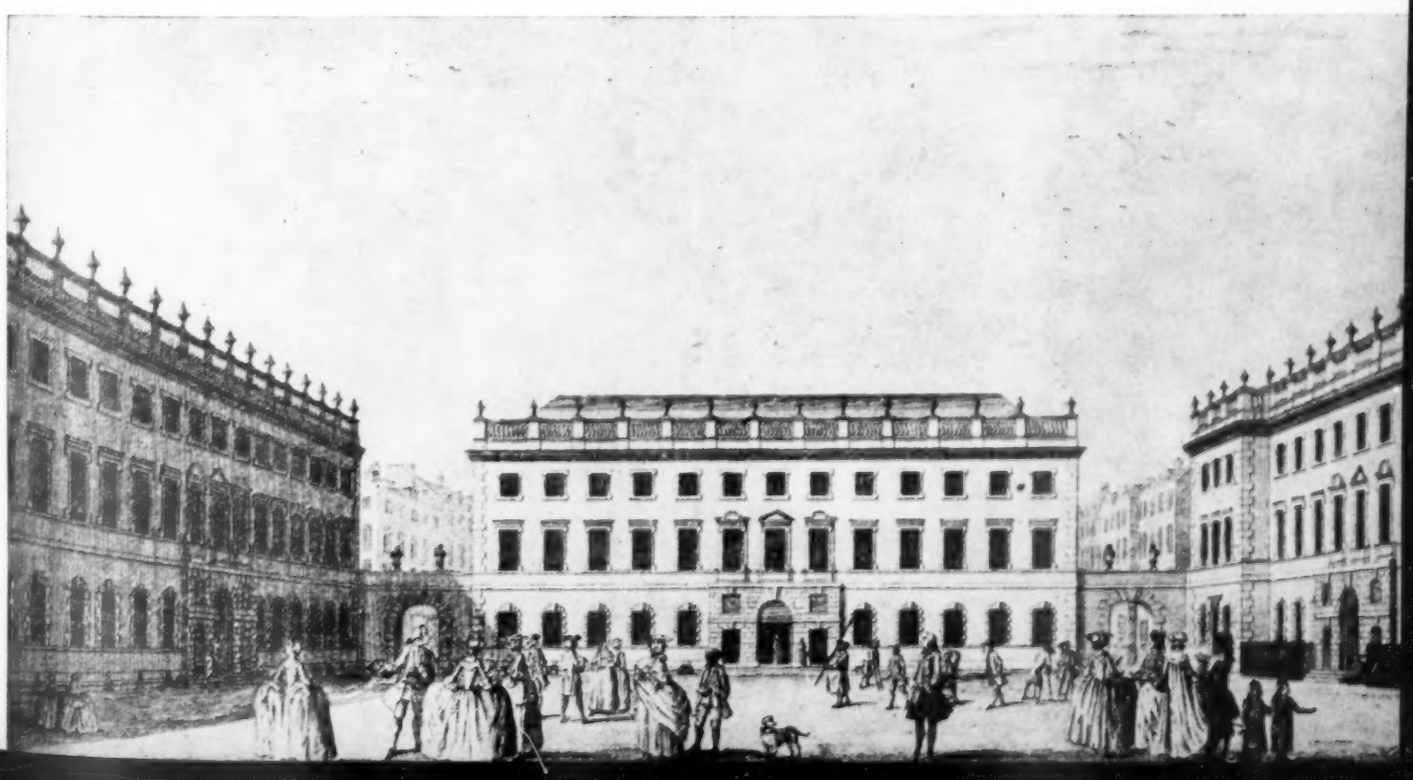
The printed rules of the hospital required that the Apothecary "take care that the Physick be duly administered to the Patients, according to the Prescriptions of the Doctors" and "That the Grand Physical Medicines be dispensed in this House, and that all the Physical and Chirurgical Medicines be viewed four times a year by the Physicians and Chirurgions of this House, in presence of the Treasurer and two Governors at least; and such Medicines as are Bad, to be Destroved."

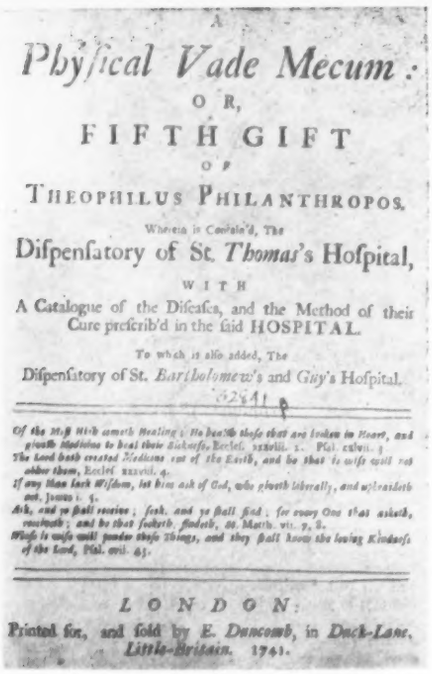
Drugs and Therapeutics in London Hospital Practice

Probably because of his personal experience at St. Thomas's, Poole devoted a great deal more space to the prescriptions of this institution than to those of St. Bartholomew's and Guy's Hospitals. A catalogue of 106 afflictions ranging from "itching blood" to "Leprosy" and from "Madness" to "Gun-shot wounds" had been compiled by the author for which alleged remedies could be found in the formulary of St. Thomas's Hospital.

Many of the medications and commentaries in the list of recipes from St. Thomas's were reprinted by Poole from the first edition of Henry Banyer's *Pharmacopoeia Pauperum* which had been published in 1718. The strong speculative nature of therapeutics, with its emphasis on humoral pathology, which had permeated Banyer's formulary, was of course present in Poole's *Fifth Gift*. Similarly, the mixture of the bizarre and the empirical which characterized the materia medica of the time, was certainly evident in both works. The following recipes will illustrate this:

St. Bartholomew's Hospital about 1752





A
Phyſical Vade Mecum:
OR,
A
FIFTH GIFT
OF
THEOPHILUS PHILANTHROPOS,
Wherein is Contain'd, The
Diſpenſatory of St. *Thomas*'s Hoſpital,
WITH
A Catalogue of the Diſeaſes, and the Method of their Cure preſcrib'd in the ſaid HOSPITAL.
To which is alſo added, The
Diſpenſatory of St. *Bartholomew*'s and *Guy*'s Hoſpital.

Of the Moſt High cometh Healing; He healeth thoſe that are broken in Heart, and giveth Medicine to heal their Sickneſs. Eccleſ. xxxviii. 2. Pſal. cxlvii. 3.
The Lord hath created Medicine out of the Earth, and he that is wiſe will not abhor them, Eccleſ. xxxviii. 4.
If any man lack Wiſdom, let him aſk of God, who giveth liberally, and upbraideth not, James i. 5.
Aſk, and ye ſhall receive; ſeek, and ye ſhall find; for every One that aſketh, receiveth; and he that ſeeketh, findeth, &c. Matth. vii. 7, 8.
Whoſo is wiſe will ponder theſe Things, and they ſhall know the loving Kindneſs of the Lord, Pſal. cvii. 43.

LONDON:
Printed for, and ſold by *E. Duncomb*, in *Duck-Lane*, *Little-Britain*. 1741.

Title page of Robert Poole's formulary

Aqua Limacum or Snail Water*

Take Garden-Snails cleansed and bruised 6 Gallons, Earthworms washed and bruised 3 gallons, of Common Wormwood, Ground-Ivy, Carduus, each one Pound and half, Penniroyal, Juniper-Berries, Fennel-seed, Aniseed, each half a Pound, Cloves and Cubebs bruised, each 3 Ounces, Spirit of Wine, and Spring-water, of each 8 gallons; digest them together for the Space of 2-4 Hours, and then draw it off in a common Alembick.

This is admirable well-contrived both for Cheapness and Efficacy; and for Persons whose Circumstances and Manner of living have not habituated them to any Delicacies, it is as good a Snail-water as can be made, and with the two former, [The Alixiterial Milk-Water and The Liberans Water] are the chief that are used in the Hospitals. And as they are mostly given in Consumptions contracted from vicious Practices, and Venereal Contagions, this is the constant Drink of those who are under the like Weaknesses and Decays from a *malum flamen*, and require principally Nourishment from such Substances, as will with the least trouble possible, be assimulated for that purpose.

Balsam Polychrestum or Balsam of many Vertues

Take 2 Pints and half of Spirit of Wine; infuse in it with a gentle Heat, and often stirring, in 12 Ounces of the Gum of Guajacum; and lastly, add 1 Spoonful of *Peruvian* Balsam; so that the whole may mix into a Balsam.

This is an efficacious Medicine for many good Purposes, but particularly to warm and defend the Nerves from those Defluxions which prejudice their Motions, which, when they prove of a saline tartarous Kind, make the Gout in the Joints; to preserve against which, this is a most excellent Medicine; it dries up, or dissipates by insensible transpiration all superflous Moistures, is good in all Venereal and Scrophulous cases, and very certainly wears off an old Gleet, where the Virulence has been previously remov'd; it is usually taken from 20 to 30 Drops.

N.B. It may conveniently be taken in Water, by adding to it one third, or half the Number of Drops of Spirit of Hartshorn, for otherwise it cannot well be taken in Water, which it turns white and coagulates.

Calomel

This is a Preparation from *Mercurius Dulcis*, which is made of Corrosive Sublimate 4 Ounces, and Crude Mercury 3 Ounces, ground together, till the Quicksilver disappears, and then sublimated in a Glass Bolt-head, first over a gentle Fire, and then a very strong one; which being three times repeated, is then called *Mercurius Dulcis*: Which being again sublimated three times, it is then called *Calomel*. Dose to young Children from 2 to 8 Grains, and to Grown Persons to 1 Scruple. It is reckon'd very effective against Worms in Children, and purges those slimy Humours from whence arise so many of their Disorders: It is also much us'd to grown Persons in Rheumatisms, healing of old Ulcers in any Part of the Body, and to cleanse the Blood of many Impurities; especially in a Venereal Habit, in which it is of most excellent Service: If some time continued, it causes as large a Salivation as by Unction; but frequently it works by Stool, and then it causes to flux but little by the Mouth.

Castor

That which comes from *Russia* is the best, is much redder in Colour, and of a more fragrant, volatile and pungent scent. This is of very extensive Use in Medicine, and enters into almost all the Nervine Compositions of the Shops, as well as the extemporaneous Prescriptions of like Intentions. It is certainly a most noble Drug, and of great Use in all Distempers of the Head: And as many Disorders of the Womb have their Rise from some Distemperature of the nervous System; so in all such Cases it is likewise of great Service. In the Height of Fevers, when the Nerves begin to be convulsed, it is very effectual not only to keep off a *Delirium*, but to forward a *Diaphoreses*, and bring the Distemper to a *Crisis*. *Etmuller*, with some others will have it also to be good in the Measles and Small-Pox. The *Tincture* which is made of it, is an excellent Medicine.

The *Physical Vade Mecum* or *Fifth Gift* of Robert Poole, alias Theophilus Philanthropus, was a worthy successor to the *Pharmacopoeia Pauperum* of Henry Banyer. Not only did the reader have available lists of medication used at three London hospitals, but also an excellent description of the administrative functioning and physical facilities at St. Thomas's, "A Vocabulary of Herbs and Drugs," including "A Vocabulary of Drugs Sold by the Druggists," and a rousing reminder that "for anyone to be careful only about the Cure of the Body, while the Soul at the same Time is suffering to perish everlastingly unregarded . . . is only acting the Part of a Heathen toward his fellow Creature."

*[In Banyer's formulary (1718) and reprinted by Poole]

References

1. See "Henry Banyer's Hospital Dispensatories," *Bull. Amer. Soc. Hosp. Pharm.*, 13:322-325, 1956.
2. *Dictionary of National Biography*, XVI, 103-104.
3. See Church, W. S.: "Note on the Six Gifts of Theophilus Philanthropos or Robert Poole," *St. Bartholomew's Hospital Reports*, 21:231-236, 1885.
4. Poole, Robert: *The Chymical Vade Mecum: or, A Compendium of Chymistry*, London, 1748, Preface, p. II.

suggested specifications for a

GENERAL PURPOSE

HOSPITAL

DISINFECTANT

by EMIL G. KLARMANN

► IT IS GENERALLY ACCEPTED, that no single germicide is optimally effective under all conditions which call for the application of an antimicrobial agent; in other words, it is entirely conceivable that a germicide formulated especially for a particular use, may yield a performance inferior to that of a general utility germicide when put to the same use.

EMIL G. KLARMANN, Sc.D., is Vice President and Manager of Technical Services of Lehn and Fink, Inc., New York, N. Y.

While this premise constitutes a valid rationale for the formulation of antibacterial agents of a more or less well circumscribed usefulness (such as housekeeping disinfectants, instrument disinfectants, skin antiseptics, etc.), it is true that some germicides lend themselves for a variety of uses, thereby reducing the need for special formulations of limited utility. Being aware of this fact, many hospitals and other institutions express their preference for a multi-purpose type of germicidal product, usually for the sake of simplifica-

tion of procedural routine. Unfortunately, insufficient consideration is being given at times to the need for proper demonstration of its performance under the different conditions of the several uses for which such a product is recommended.

It is axiomatic that any testing method employed in the evaluation of a germicidal agent as to its fitness for use in one or more areas of hospital sanitation, should endeavor to approximate the conditions under which such an agent is applied in actual, practical usage. One of the fundamental (yet often neglected) aspects of such a test should be its verified ability to furnish unequivocal evidence that following exposure to the action of a given germicide, the pathogenic microorganisms are no longer capable of causing trouble if they should find their way into a surgical wound, onto a susceptible mucous membrane, etc., as the case may be with respect to the mode of infection by any particular pathogen; in other words, the *in vitro* demonstrated activity of a given antimicrobial agent must not be subject to *in vivo* reversal, *viz.* upon contact with physiological or pathological matter which would permit first microbial proliferation and, ultimately, a generalized infection to take place.

For obvious reasons, a multipurpose hospital disinfectant should be non-specific in action, *i.e.* able to kill all those microbes of epidemiological or surgical significance whose elimination is essential in the several phases of hospital practice. As such, it should justify the presumption of microbicidal effectiveness for all pertinent types of disease organisms, *i.e.* not just for some types to the exclusion of others (*e. g.* for typhoid bacilli, but not for streptococci). Conversely, where the problem is one of controlling a particular microorganism (*e. g.* the tubercle bacillus in a TB ward, or the hemolyzing staphylococcus in the hospital nursery), the user of the "hospital disinfectant" should have the assurance that the product indeed is capable of killing the infectious microorganism which is of primary significance in any special case.

Lack of Standardization of Testing Technique

While some of the other desirable qualifications of a hospital disinfectant will be reviewed elsewhere in this paper, it would seem fairly simple to secure the all-important information concerning the antimicrobial potency of a product considered as a hospital disinfectant. Actually, the problem is far from being simple; and the attendant difficulties stem primarily from a lack of standardization of testing methods which are deemed to be applicable to any particular task by the individual bacteriologist. Thus with respect to many a germicide, the literature is full of contradictory data; and this is mostly due to differences in bacteriological testing procedures which may yield widely differing results depending upon the experimental conditions selected for the assay. As a result, a given product may or may not furnish the kind of performance expected of it when put to practical use.

This is a most unfortunate condition in view of the important role which chemical disinfection is called upon to play in hospitals, as a means of guarding against the spread of contagion of environmental and of contact origin. As to the latter, infection-laden hands, instruments, and appliances constitute the most common vehicles of direct transmission. And as to the former, there exists a substantial amount of published evidence to the effect that hospital premises may become sources of contagion through contamination by infectious matter originating with the patient, and distributed unwittingly by hospital personnel; in this case, the respiratory tract and the skin of the carriers serve as the primary source of pathogens which reach the new host indirectly via the route of the "secondary reservoirs" (such as floors, furniture, bedding, etc.) following their dispersal as dry fomites by air currents, by mechanical activity, and otherwise.[1-3] While direct infection by means of droplets or droplet nuclei is a significant factor to be considered in this picture, it is a matter of experimental record that most of the mucus expelled by forced respiratory action does not remain suspended, but that it tends to sediment upon the environmental surfaces.

The problem of nosocomial infection through the agency of environmental pathogens has become further aggravated of late by the appearance of antibiotic-resistant staphylococci. Because of this, it is no longer safe to place reliance upon the prophylactic action of antibiotics, particularly in view of the recorded gradual emergence of staphylococci possessed of a

resistance to the different types of antibiotics which have been introduced successively in an effort to find *the one* antibiotic that would be active against all such staphylococcal variants. By the same token, renewed and heightened attention is being paid not only to correct observance of aseptic technique, but also to a more effective control of the environmental hazards of infection.[2,3,4]

The latter requires, among other things, regular disinfection of the operating room area; however, proper consideration must be given to the hospital as a whole in order to eliminate the possibility of microbial contamination being transferred to and from the operating room area, to and from the recovery room, the maternity ward, the nursery, etc.

At any rate it should be evident that a product bearing the designation "hospital disinfectant" must be germicidal for antibiotic-resistant staphylococci (*i.e.* in addition to all other pathogens of significance in hospital routine). And it might be stressed at this point that "soap-and-water" cleaning does not go far enough in this respect because a soap solution is not a staphylocidal disinfectant.

Instruments and Appliances

Sterilization, in the true sense of this term, means destruction of all forms of life, including that of *resistant* bacterial spores (such as those of *Clostridium tetani, C. sporogenes* and *Bacillus anthracis*). It can be achieved by autoclaving (with superheated steam), by low-temperature treatment with certain reactive gases (ethylene oxide), and by boiling with suitable disinfectants. There does not seem to be any chemical substance which, *acting at normal room temperature,* can be relied upon to kill *resistant* bacterial spores within a period of time comparable to that in which any of the three procedures mentioned will produce such an effect.[5] Claims based upon results obtained with spores of *low* resistance are dangerously misleading because they could induce a false sense of security, in view of their irrelevance to pertinent hospital procedures. It should be noted, however, that the most common microbial contaminants of instruments and appliances are staphylococci and streptococci, also coliform bacilli; other frequent contaminants are from the *Pseudomonas* and *B. proteus* classes. While *Mycobacterium tuberculosis* is not encountered very often on instruments, its presence should be regarded as presumptive with respect to objects such as endoscopes (including broncho- and cystoscopes), also oral thermometers.

More recently, the transmission of homologous serum hepatitis has assumed a significant role. The infection is conveyed not only by the introduction of virus-bearing blood or blood products, but also by infected blood residues remaining in hypodermic syringes and other instruments used on open or latent hepatitis cases. According to available evidence, this virus is not readily inactivated by chemical disinfectants acting at room temperature.[6] (Incidentally, the same is true of the virus of infectious hepatitis.) Autoclaving or boiling, preferably in the presence of a suitable disinfectant, will perform satisfactorily.

Some Statutory Aspects

It may not be realized generally, that commerce in disinfectants, antiseptics and related materials is subject to statutory regulation under the provisions of two pieces of federal legislation, *viz.* the Federal Insecticide, Fungicide and Rodenticide Act, and the Federal Food, Drug and Cosmetic Act. Both acts contain a variety of requirements which extend considerable protection to the public in the matter of proper usage of antibacterial agents, by virtue of regulatory supervision of certain aspects of their formulation and of proper direction for their use. Although the commerce in hospital disinfectants is subject to the same laws, a minimum of regulatory attention is devoted to this area, no doubt, on the premise that hospitals being staffed by experts are not in need of any such assistance. While this premise is justified in some cases, it may not apply in others.

At any rate, according to authoritative opinion, the role of disinfection in the hospital is by no means unimportant or inconsequential. There is considerable published information which correlates the likelihood of infection and cross-infection of environmental origin with the rational selection and correct application of disinfectants. In this picture, the responsibility of the informed manufacturer or supplier plays an important role inasmuch as it is up to him to furnish information both as to the virtues and the limitations of his product. However, in the last analysis it is the responsibility of the delegated hospital authority to select the proper germicidal material, and to have it applied in such a manner as would satisfy the purpose of the required antimicrobial procedure effectively and dependably.

Basic Premise of Specification

In order to help serve this purpose, the following lines will be devoted to the development of a specification for a general purpose hospital disinfectant, and to a justification of its several provisions.

The premise upon which it is proposed to proceed is this: Whereas numerous testing methods have been suggested over a period of time for the evaluation of germicides in their various aspects, most of them suffer from a lack of agreement among bacteriologists as to their general acceptability. (Of course, it would be impossible to review even the more important tests within the framework of this presentation.) Since the slightest differences in procedure may, and often

do, have a profound effect upon the outcome of the test, it is postulated that preference should be given to "official" testing methods which enjoy the endorsement of, and routine usage by a federal regulatory agency of the U. S. Government; above all, this would provide the important presumption of impartiality and, by the same token, eliminate any possible objection as to bias on the part of the bacteriologist, in behalf of some special test procedure tending to favor a particular germicide.[7]

The "Phenol Coefficient" Method

What are these methods? Screening of disinfectants for the sake of a general orientation as to their fitness for use is done by the "A. O. A. C. Phenol Coefficient" method. As is generally known, the phenol coefficient (unless otherwise qualified) is a figure indicating how many times more effective a given disinfectant is than phenol (or pure carbolic acid) against the test organism, *Salmonella typhosa*. To obtain this information the test is carried out under rigidly specified conditions of temperature, duration of exposure, resistance of the bacterial strain employed, and others.[8]

It was thought, at one time, that this phenol coefficient could be regarded as a yardstick of a given disinfectant's germicidal potency, and this on the assumption that the action upon the typhoid organism paralleled that upon other pathogenic bacteria. Unfortunately, this utterly mistaken idea is still encountered in many quarters although it has been known for a long time that the assumption of any such antibacterial parallelism is devoid of general validity.

Originally, this phenol coefficient has been used as the sole guide for the preparation of solutions for general disinfecting purposes. According to pertinent official requirements, such solutions must correspond in their disinfectant efficacy to a 5 percent carbolic acid solution. A simple mathematical computation shows that multiplying the phenol coefficient by twenty yields the dilution in which a particular disinfectant should be employed. Thus, a product with a phenol coefficient of 5 would be employed in a dilution of 1:100 or 1 percent, a disinfectant with a phenol coefficient of 10 may be diluted to the extent of 1:200 or ½ percent, and so forth.

With specific reference to hospital disinfection it should be noted, however that this procedure will not insure bactericidal action upon other pathogens, and especially not upon bacteria whose control by means of disinfection is essential in certain phases of hospital practice. Thus, if a pine oil disinfectant with a declared phenol coefficient of 5 were diluted according to the formula "twenty times the phenol coefficient," the resulting 1 percent solution would be found incapable of killing staphylococci. (Actually, even when used full strength, a pine oil disinfectant may not always produce such an effect.) Hence a pine oil disinfectant will not qualify for hospital use. Similar considerations apply to certain other categories of disinfectants, or to specific members of otherwise acceptable classes.

The "Use-Dilution" Method

In the more recent past, indications have been multiplying that the determination of disinfectant efficiency by means of the phenol coefficient method yielded misleading results in numerous instances; there was reason to believe that the discrepancies between the calculated and the effective disinfectant dilutions were so great as to raise serious doubt concerning the germicidal performance of the former. Official recognition of this situation culminated in the publication in May 1953 of a supplementary testing procedure designated originally as "Use-Dilution Confirmation Tests for Results Obtained by Phenol Coefficient Methods."[9] Following is the author's point of departure:

"It has been commonly accepted that germicides used at dilutions equivalent in efficiency against *S. typhosa* to 5 percent phenol at 20°C. in the phenol coefficient method will possess reasonable margins of safety for the destruction of infective agents likely to be the object of most general disinfectant processes. . . . "During the last 10 years a rather alarming increase has been noted in the number of commercial products which . . . do not provide adequate margins of safety for disinfection even though they bear apparently valid phenol coefficient claims . . . It appeared necessary, therefore, to develop some confirmatory test procedures which could be employed as a check on the practical significance of phenol coefficient values."

The "A. O. A. C. Use-Dilution" procedure differs from the several phenol coefficient methods in that it employs bacteria deposited on carriers *viz.*, polished stainless steel rings ("penicillin cups") rather than their suspensions in nutrient broth.[10] Two test organisms are specified, *Salmonella choleraesuis* and *Micrococcus pyogenes* var. *aureus*. (The reason for replacing *S. typhosa* of the A. O. A. C. phenol coefficient method by *S. choleraesuis* is that the former does not resist drying on the steel rings.) The salient features of the test are as follows:

The ring carriers are dropped in the broth culture, then removed after a specified contact period, and allowed to dry. The contaminated rings are put into 10 tubes, one ring to each tube containing the dilution of the disinfectant under test derived from its A. O. A. C. phenol coefficient, as described above (*i.e.*, 20 times the *S. typhosa* phenol coefficient), and the tubes

plus rings are held for 10 minutes in a water bath at 20° C. At the end of this period the rings are transferred into ten individual tubes of subculture broth and incubated at 37° C. Where there is reason to believe that the disinfectant is capable of bacteriostasis which has not been inactivated by the subculture medium employed, the rings are retransferred to second tubes of medium to provide reduction by dilution of any adsorbed material, presumably below its bacteriostatic range. The absence of growth in all 10 tubes following incubation is regarded as confirmation of the use-dilution derived from the A. O. A. C. phenol coefficient. By contrast, growth in some or in all of the 10 tubes indicates that the A. O. A. C. phenol coefficient was unsatisfactory to serve as a guide for the preparation of the proper dilution; in this case the ring test is repeated using higher disinfectant concentrations in order to ascertain the point at which the product may be deemed effective in practical usage.

The assay with *M. pyogenes* var. *aureus* as test organism must be performed upon products recommended for use as disinfectants in hospitals "or places where pyogenic bacteria are likely to have special significance." The dilution derived from the A. O. A. C. phenol coefficient must be effective against this microorganism, otherwise a higher concentration must be specified which will produce a bactericidal effect under the conditions of the "Use-Dilution" test.

Unfortunately, there exists an exception to the rule that the germicidal concentration obtained by the "Use-Dilution" method is found to be equal to, or higher than the active concentration obtained by the "Phenol Coefficient" method. A special validation procedure for the "Use-Dilution" test as devised by its authors,[9] indicates that in some instances (*e.g.* with iodophors) the effective concentration determined by the "Phenol Coefficient" test (and presumably equivalent in effectiveness to 5 percent carbolic acid) is higher and thus likely to yield a more satisfactory disinfectant performance than that obtained directly by the "Use-Dilution" method.[7] Under such exceptional circumstances, it is logical to require the employment of the higher concentration indicated by the "Phenol Coefficient" assay for purposes of practical environmental disinfection.

Incidentally, the satisfactory outcome of the "Use-Dilution" test with *M. pyogenes* var. *aureus* as test organism, offers also presumptive evidence that a disinfectant solution effective under the conditions of this test may possess the capacity to kill typical pyogenic cocci of surgical significance, even in the presence of blood; here a special validation procedure has been devised to verify this presumption.[9] To this extent, therefore, the "Use-Dilution" method, preferably in combination with the proper validation technique, may serve in the screening of preparations represented as being suitable for the *disinfection* of instruments and appliances. (This is not to be confused with "sterilization" which includes effectiveness against resistant bacterial spores, as mentioned above.)

Tests for Fungicidal and Tuberculocidal Action

Fungicidal potency should be an attribute of a "hospital disinfectant" in view of the infectious character of pathogenic fungi. Screening for this quality is performed by the official "A. O. A. C. Fungicidal Test" which employs *Trichophyton interdigitale* as the test organism.[11]

There is as yet no published official test for tuberculocidal action; however, a satisfactory method can be patterned along the lines of the "A. O. A. C. Phenol Coefficient" procedure, using a virulent strain of *M. tuberculosis* as test organism.[12]

Of course, there is hardly any doubt as to the justification of a requirement for tuberculocidal potency to be exhibited by a "hospital disinfectant." This requirement has a general institutional significance in view of the established fact that hospitals are called upon to admit patients with unrecognized tuberculosis who may spend several days or weeks upon the premises before the correct diagnosis is made. During this period, such patients constitute an obvious hazard to other patients, as well as to hospital personnel. The environmental aspect of this hazard which is susceptible to control by the use of a disinfectant cannot be dealt with effectively unless, of course, the disinfectant is possessed of demonstrable tuberculocidal action.

It should be realized that the several test organisms featured thus far represent but a small fraction of the total microbial spectrum which must be controlled in effective hospital sanitation. Yet experience teaches that germicides which perform satisfactorily under the conditions of the several tests described, are likely to exhibit a comparable or sometimes a stronger effect against other vegetative pathogens, (including streptococci, enteric bacteria and pseudomonads). Of course, where the problem is one of ascertaining the effectiveness of a disinfectant against a particular pathogen under special conditions of use (*e.g.* the disinfection of a TB contaminated area), a special test may be set up reproducing the conditions of such usage as completely as possible. On the other hand full compliance with the requirements of the A.O.A.C. "Phenol Coefficient," the "Use-Dilution," and the "Fungicidal Action" tests, and of the "Tuberculocidal Action" test will indicate that the germicide under study merits consideration as a general utility hospital disinfectant.

Safety in Handling

Some comment may be indicated here as to the safety of the disinfection routine. Other things being

equal, the use of disinfectants even by untrained maintenance personnel should not create any hazards of toxicity by ingestion, or of injury by contact.

Modern chemistry has placed in the hands of disinfectant formulators chemicals which combine bactericidal efficiency with a comparative freedom from toxicity. This is in contrast to such older materials as carbolic acid or cresol which are toxic, also corrosive to tissue, yet comparatively weak in regard to germicidal performance. In order to provide a suitable standard of comparative harmlessness, advantage may be taken of Interpretation No. 18 to the Federal Insecticide, Fungicide and Rodenticide Act which establishes four categories of toxicity and sets up labeling requirements for each of them. Satisfactory hospitals disinfectants can be formulated which would fall in the fourth, i.e. the least toxic category of products (characterized by an oral LD_{50} of more than 5 grams per kilogram).

The Odor and pH Problems

Hospitals and sanatoria, in which disinfection is being practiced regularly, appreciate the absence of irritant or disagreeable "disinfectant" smells which in the past used to annoy patients and personnel alike. A requirement as to the absence of any objectionable odor appears justified, as it is based upon the premise of an actual and adequate availability of chemicals which lend themselves readily to the formulation of germicidal concentrates yielding substantially odorless use dilutions.

Since disinfectants come in contact with different materials in the course of their routine use, it is fair to require a substantially neutral reaction of their solutions. Acidity, even of low order, may create a corrosion problem in connection with the disinfection of metal instruments or utensils, while alkalinity may be damaging to various surface finishes, to fabrics, to some metals, etc.

Economic Aspects

Since considerations of economy often play an important role, particularly where extensive environmental disinfection is concerned, some comment appears to be indicated concerning comparative cost evaluation. Obviously, the cost of a disinfectant should not be related solely to the concentrate, as furnished to the hospital; instead, it should be considered in terms of the *dilution* which is fit for its largest use (ordinarily for environmental disinfection). It is evident that in spite of its higher cost, "Disinfectant A" may be more economical in use, if it is employed in a substantially higher dilution (*i.e.* in a lower concentration) than "Disinfectant B," even though the latter may cost less per unit of concentrate. Hence it would appear only logical to correlate any comparative cost considerations with the effective use-dilution of the disinfectant under study, rather than with its concentrated form.

With all these ideas as a premise, the following performance specification is suggested by way of providing a measure of assurance as to the presumptive fitness of a given germicide for general hospital purposes, and especially for environmental disinfection:

Specification for a Hospital Disinfectant (General Purpose)

1. Registration:—The disinfectant shall be registered under the pertinent provision of the Federal Insecticide, Fungicide and Rodenticide Act.

2. Phenol Coefficient:—Where applicable, the A. O. A. C. phenol coefficient shall not be less than 5, with *Salmonella typhosa* as the test organism (A. O. A. C. Official and Tentative Methods of Analysis, 8th ed., Washington, D.C. 1955).

3. Use-Dilution:—The solution specified for general disinfecting purposes shall be germicidal for both *Salmonella choleraesuis* and *Micrococcus pyogenes* var. *aureus* under the conditions of the A. O. A. C. "Use-Dilution" method, except that if a lower use-dilution (*i.e.* a higher concentration) is indicated by the A. O. A. C. "Phenol Coefficient" test with *Salmonella typhosa* (corresponding in action to a 5 percent phenol solution), the latter dilution shall be prescribed as the use-solution for general disinfecting purposes (A. O. A. C. Official and Tentative Methods of Analysis, 8th ed., Washington, D.C. 1955).

4. Fungicidal Action:—The recommended use-dilution, as defined in paragraph 3 of this specification, shall be able to kill *Trichophyton interdigitale* (A.O.A.C. Official and Tentative Methods of Analysis, 8th ed., Washington, D.C., 1955).

5. Tuberculocidal Action:—The recommended use-dilution, as defined in paragraph 3 of this specification, shall be able to kill the virulent strain of *Mycobacterium tuberculosis* H37Rv when tested by the method (under 5.1, below) which constitutes an integral part of this specification.

6. Toxicity:—The acute oral toxicity (LD_{50}) of the concentrate shall be within the fourth category of toxicity as defined by Interpretation No. 18 to the Federal Insecticide, Fungicide and Rodenticide Act (162.116b); *i.e.*, the single oral dose producing death in half or more than half the test animals (mice, rats and guinea pigs) shall not be lower than 5 milligrams per gram of body weight.

7. Irritancy:—No recommended use-dilution of the disinfectant shall be more irritant than a 1 percent aqueous solution of Liquor Cresolis Saponatus NF IX when applied to the skin of a closely-clipped adult albino rabbit on a pad of cotton gauze (1 inch square, two layers thick) for a period of 8 hours at the rate of 1 ml. of solution per pad.

8. Solubility:—The disinfectant shall form clear use solutions (colorless or tinted) with distilled or deionized water.

9. Reaction:—The pH of the use-dilution, as defined in paragraph 3 of this specification, shall be within the range of 6.5 to 10.5 when prepared with distilled water and read at 25°C (77°F).

10. Odor:—The use solutions of the disinfectant in distilled water shall be either substantially odorless or show only a faint pleasant odor.

11. Stability:—The disinfectant shall not show appreciable loss in germicidal action during 1 year of storage under normal service conditions.

12. Relative Cost.—This shall be determined on the basis of the cost per gallon of the specified use-dilution as defined in paragraph 3 of this specification.

13. Labeling:—This shall furnish all the information required by pertinent Federal or State laws affecting the labeling of disinfectants, and it shall state the proper dilutions for the following purposes:

(a) General disinfection
(b) Disinfection of instruments and appliances
(a) Antiseptic use, if any

Tuberculocidal Action

5.1 Method of Test; constituting an integral part of the Specification for Hospital Disinfectant, General Purpose.

Synthetic Fluid Medium
(Modified Proskauer and Beck)

Monopotassium phosphate	2.5 Gm.
Asparagin	5.0 Gm.
Magnesium sulfate	0.6 Gm.
Magnesium citrate	2.5 Gm.
Glycerin	20.0 ml.
Distilled water	1000.0 ml.

Adjust to *p*H of 7.2 to 7.4 with N/1 NaOH, filter, tube or bottle, and autoclave at 15 pounds pressure for 20 min.

For growing the test culture, round 50 ml. bottles containing 25 ml. of medium and about 2 layers of glass beads, 6 mm. in diameter, are used. The culture grows as a pellicle on the surface and is ready for use after 3 weeks' incubation. The bottle is closed with a sterile rubber stopper, shaken until clumps are broken, filtered through a 200 stainless steel filter, diluted with 0.85 percent NaCl to the opacity of a 500 ppm LaMotte hard water standard. It is then employed by the regular A.O.A.C. phenol coefficient test procedure.

The subculture broth is the same as above, except for the addition of 1 percent of bovine serum; it is tubed at the rate of 10 ml. per tube, 0.1 ml. of serum being added per tube before using. (In the case of disinfectants with significant bacteriostatic action the serum concentration in the subculture broth is increased to 10%).

The results of the test may be read after an incubation period of 5 weeks at 37°C, but the tubes should not be discarded until 8 weeks following the performance of the test, and any changes noted then.

An acceptable *M. tuberculosis* culture is killed by a 1:60 dilution of phenol, but survives at 1:70 dilution in 10 minutes at 20°C.

Confirmatory tests shall be run by injection into guinea pigs, (0.5 ml. per pig). The animals are kept under observation for 3 months; if they do not die of TB infection at that time, they are examined by autopsy.

(Footnote)

*For the sake of completeness, mention should be made at this point of the Federal Specification O-D-406 for "Disinfectant, Germicidal and Fungicidal, Concentrate." This specification applies to a general maintenance type of disinfectant more than to a hospital disinfectant although verified compliance with its several performance requirements might justify a broader inquiry into a given product's potential fitness for hospital use. Specification O-D-406 employs special bacteriologic test procedures which differ from those of the A. O. A. C.; they are based upon the work of Stedman, Kravitz and Bell.[13] They do not include a test for tuberculocidal action.

Summary

Disinfectants belong to a group of materials which are subject to regulatory supervision under the Federal Insecticide, Fungicide and Rodenticide Act. The benefits of this regulatory action extend mostly to disinfectants sold in interstate commerce for consumer use, by way of assuring a measure of antibacterial potency for which such products are purchased. This is achieved, among other things, by verifying on the regulatory level that the representations made on the container label regarding a given product's antibacterial effectiveness are supported by experimental evidence, as obtained by means of testing methods endorsed by the federal agency in charge of enforcing the above statute, together with its pertinent regulations and interpretations. Hospitals do not benefit by this official activity in the same measure on the presumption that being staffed by experts, they are not in need of any regulatory control of materials which they use. As a result, the way is left open to the use of nonstandard testing methods which yield varying and often contradictory results. Of necessity, this engenders a host of conflicting claims and counterclaims, and creates a situation in which the important contribution of correct disinfection to over-all hospital sanitation is impeded or even vitiated.

With this as a premise, a specification is being suggested for a general purpose hospital disinfectant containing a number of performance requirements which are verifiable by means of tests enjoying recognition on the federal regulatory level referred to. It specifies some supplementary requirements for which officially recognized tests are not yet available, but which are deemed to be germane to the problem under consideration. The primary purpose of relating the specification in its most essential aspects to official testing methods is to eliminate the disturbing factor of subjectivity with respect to any particular nonstandard procedure where a standardized one is available. While it is not claimed that compliance with all the requirements of the suggested specification will necessarily provide a hospital disinfectant of universal acceptability, experience teaches that such a disinfectant will be possessed at least of a presumptive fitness for hospital use meriting further evaluation with the aid of any additional criteria which may apply at any particular institution or department.

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an improved

BARIUM SULFATE

SUSPENSION

A Preliminary Report

by JOSEPH H. BECKERMAN

► APPROXIMATELY FIVE YEARS AGO, DR. PAUL C. HODGES of the University of Chicago in a symposium of Roentgen Examination of the Gastro-Intestinal Tract given before the Section of Radiology at the 102nd Annual Meeting of the American Medical Association stated that radiologists, chemists and pharmacists should be encouraged to work at improving barium sulfate suspensions.[1]

Barium sulfate was introduced by Bachem and Gunther in 1910 as a radiopaque replacing bismuth salts which had been used since 1897.[2] Insoluble barium sulfate has been the standard opaque medium for over 40 years because of its availability, conformity to rigid standards of purity, and inexpensiveness.

In describing an ideal medium Windholz et al[3] state that the medium would provide a uniform, smooth radiopaque coating, mix readily with secretions, would not be influenced by variations of *p*H, mucus secretions, and would pass promptly through the bowel with no tendency to break up into isolated collections or to become inspissated and impacted.

Barium sulfate for x-ray examination should be of a suitable quality. A major supplier of chemicals for pharmaceutical use specifically marks their barium sulfate U.S.P. for x-ray diagnosis. The prime difference in the specifications concern its relative bulkiness and arsenic content.[4] The average particle size is said to be 1 to 2 microns. Our own studies show particle size, as determined by an ocular micrometer, to be approximately from .7 to 1.2 microns.

Barium sulfate may be given as a simple suspension in water or saline or as more complex mixtures containing various gums such as acacia, tragacanth, or gum karaya. Other suspending agents used by investigators run a wide and varied gauntlet including materials such as pectin, gelatin,[5] bentonite,[6] aluminum hydroxide gel,[7] gastric mucin,[8] and more recently, the synthetic gums, methylcellulose[9] or sodium carboxymethylcellulose (CMC). In our own experience we found sodium carboxymethylcellulose (CMC) in a two percent concentration extremely effective in holding barium sulfate in suspension. Its further advantage is ease of preparation of the suspension; it is nontoxic, not affected by gastric or intestinal secretions and, unlike the natural gums, it is not digested, thus acting to form a lubricating bulk laxative.

In addition to the sodium carboxymethylcellulose as a suspending agent, the formula contains dioctyl sodiumsulfosuccinate (Aerosol OT) a wetting agent commonly used as a fecal softener.[10] This serves to overcome the fairly frequent occurrence of impaction. In addition, the inclusion of a wetting agent should increase contact between the radiopaque material and the gastric mucosa, thus giving rise to films of greater detail. Because of the extremely bitter taste of dioctyl sodium sulfosuccinate it was necessary to use flavoring and sweetening agents in the formula.

Also included in the formula was 15 percent of Sorbitol Solution 70 percent to act both as a sweetening agent and as a suspension adjuvant.

The finished product was passed through a colloid mill to produce a homogenized suspension with a greatly reduced particle size, as determined by micrometer readings.

Films taken of the suspensions, *in vitro*, show a perfectly homogeneous shadow of good density.

Clinical studies are now in progress.

A suggested formula is as follows:

Barium Sulfate	350.0 Gm.
Sodium Carboxymethylcellulose, CMC, 70, Premium Grade, Low Viscosity	20.0 Gm.
Dioctyl Sodium Sulfosuccinate Solution 1%	160.0 ml.
Flavor (Covarome)	5.0 ml.
Saccharin Sodium	0.5 Gm.
Sorbitol Solution 70%	150.0 ml.
Distilled Water, to make	1000.0 ml

JOSEPH H. BECKERMAN is Assistant Chief Pharmacist, University of California Hospital, Los Angeles.

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Report: Committee on Hospital Pharmacy Education 1958

submitted by WARREN E. WEAVER

► THE COMMITTEE WAS UNABLE TO MEET during the year and all views expressed here were obtained by exchange of letters between the members. During 1956-57 this Committee considered the undergraduate program and its relation to hospital pharmacy. The present Committee devoted its efforts to consideration of the graduate program.

We agreed that hospital pharmacy needs men with graduate education and/or training. This is based on the feeling that the specialized area of hospital pharmacy requires more training than the present four-year course does provide or that the five-year course will provide. Even if the courses in manufacturing pharmacy, management, and seminar recommended by this Committee as suitable undergraduate material were provided by all colleges, they would provide only a "basis" for a student interested in this area.

Since hospital pharmacy may require varied type of service depending upon the need of the individual type of hospital, it is evident that the pharmacist may well require training of greater or lesser specialization depending upon the need of the hospital. Using this assumption, we agree that these undergraduate courses plus a postgraduate internship would properly prepare the pharmacist only for limited duties in some hospitals or as chief pharmacist in hospitals requiring only limited service. Similarly, the pharmaceutical requirements in many hospitals demand that the hospital pharmacist have advanced training in the graduate areas.

The graduate education of the hospital pharmacist must be based upon a sound undergraduate program in pharmacy. It would not be wise nor feasible to think that graduate courses offered to the graduate student in hospital pharmacy should follow any stereotyped or uniform pattern from college to college. As in any other area of graduate study, individual colleges would be expected to offer that type of hospital pharmacy education which the institution, by virtue of training of staff or facilities, is best or uniquely prepared to provide. The most important element in this regard, however, is the quality of the program. In no instance should the elements of good graduate education policies be perverted. There is no reason to believe that the nature of hospital pharmacy requires any less sound educational background than any other field of graduate study in the pharmaceutical area.

There seem to be certain questions raised about hospital pharmacy education specifically that deserve answers on the basis of principle. First, the matter of internship has clouded the horizon of educational requirement and the quality of instruction. We feel that internship is a separate requirement apart from graduate requirements which may or may not be a specific requirement of the institution offering graduate education in this area. If an internship is part of the graduate requirement of the institution, this should not affect the quality of the graduate offering either directly or indirectly.

In the past there have been indirect references to the quality of students entering graduate programs in hospital pharmacy. We feel that this area of study not only needs but requires the same type of high caliber student as other areas of graduate instruction. The very nature of this work, which puts the pharmacist in a direct working relationship with the physician, demands quality that cannot be compromised without lowering the status of the profession.

The type of degree to be awarded in hospital pharmacy has been discussed to some extent. In many instances, the Master's degree has been offered to prospective students as their only outlet for majoring in this area. As a consequence, it has assumed the status of a terminal degree whereas in other areas of graduate instruction, this degree is considered to be intermediate to the doctorate. We believe that hospital pharmacy requires, in some instances training at the doctorate level. Hence, the importance of maintaining quality in the Masters' programs becomes more apparent. This has been complicated to some extent by the offering of both professional or academic degrees. If the professional degree is intended as a terminal degree, it should be clearly noted by the institution, especially if the academic requirements are less than the usual academic degree offered.

Since the members of this Committee were unable to meet personally to discuss their problems at some length, we recommended a continuance of one year in order to arrange a personal meeting. It would be very profitable to explore further questions in regard to general patterns and philosophy of instruction in hospital pharmacy, how graduate education and internship complement and supplement each other, and the need hospital pharmacy has for men of various educational and training backgrounds.

Members of the Committee on Hospital Pharmacy Education of the A.A.C.P. included WARREN E. WEAVER, Chairman, WILLIAM E. HASSAN, JR., WILLIAM M. HELLER, WARREN E. MCCONNELL, PAUL PARKER and JOHN J. ZUGICH.

by PAUL PARKER

► HOSPITAL PHARMACY'S CONTINUING EDUCATION needs were served by three national institutes during 1958. Two were conducted by the American Hospital Association—one at Temple University in Philadelphia during the week of June 16 and the other at the University of Chicago during the week of July 28. The Catholic Hospital Association Institute on Hospital Pharmacy was held in conjunction with the annual convention in Atlantic City during the week of June 22. All three institutes were conducted in cooperation with the American Pharmaceutical Association and the AMERICAN SOCIETY OF HOSPITAL PHARMACISTS.

The purpose of the institutes was to provide an intensive refresher course dealing with the over-all aspects of hospital pharmacy practice. They were designed to provide information, understanding and skill, but of no less importance, there was ample opportunity for each enrollee to become acquainted with his professional associates and discuss the application of the information in terms of his individual needs.

The enrollees represented almost every state and several foreign countries; all types of hospitals—government, lay, and religious. Over 300 practicing hospital pharmacists attended the three institutes.

A.H.A. Institutes

The American Hospital Association conducts more than 60 institutes each year on many phases of hospital practice. For the past several years they have conducted two institutes on hospital pharmacy annually. They usually are held on university campuses in order to achieve an academic atmosphere. The enrollees are housed in dormitories. This provides the opportunity to become well acquainted and the lounges are commonly used for informal, spontaneous discussions.

The officers and members of the Greater Philadelphia Society of Hospital Pharmacists served as hosts to those attending the Philadelphia Institute and were represented by their president, Mr. Joseph D'Ambola, Chief Pharmacist at the Hahnemann Hospital. Members of the Illinois Society of Hospital Pharmacists were hosts to the Chicago Institute and represented by their past-president, Mr. Winston Durant, Assistant Chief Pharmacist at the University of Chicago Clinics.

The programs for the institutes were developed initially by the Program and Public Relations Committee of the AMERICAN SOCIETY OF HOSPITAL PHARMACISTS which was headed by Mr. Walter Frazier, Chief Pharmacist at the Springfield City Hospital in Springfield, Ohio. It was developed further in cooperation with Mr. Joseph Oddis, the hospital pharmacist staff representative of the American Hospital Association, Mr. Paul Parker, Director of the Division of Hospital Pharmacy of the American Pharmaceutical Association and the AMERICAN SOCIETY OF HOSPITAL PHARMACISTS, and representatives from the local hospital pharmacy organizations. Mr. Oddis and Mr. Parker served as institute coordinators.

The programs for the two institutes were almost identical and were divided into five major themes—Administration, Bulk Compounding and Sterile Products, Dispensing, Education and Information, and Expansion and Special Services. The following summary contains a statement on each major presentation which was prepared through group action and sent to all those who participated in the institutes and their administrators.

Enrollees at the Philadelphia Institute

Institutes are a continuing education program for practicing hospital pharmacists.

1958 INSTITUTES ON HOSPITAL PHARMACY

Enrollees at the Chicago Institute

Administration

1. Pharmacy, as an essential department, was identified and correlated with other departments within the organizational framework of the hospital.

2. A visual-aid presentation served to outline the representation of the hospital pharmacist at the national level. The relationships of the American Society of Hospital Pharmacists, the American Hospital Association, The Joint Commission on Accreditation of Hospitals and the Division of Hospital Pharmacy of the American Pharmaceutical Association, to the practice of hospital pharmacy were discussed. The resources and services available from these organizations were listed.

3. The how, why and what of communications were reviewed, with particular emphasis upon examples of poor communications as well as suggestions for improving communicative skills in relation to the operation and coordination of the pharmacy.

4. The need for and basic advantages of having written policies and procedures for the proper administration of the pharmacy department were presented. Suggestions were offered to aid in developing a pharmacy procedure manual.

5. Specific suggestions were made urging the pharmacist to participate in total hospital activities in order to increase his contributions as an active member of the administrative team.

6. A system for handling emergency medication orders on nursing stations was presented.

7. Suggestions were made to help pharmacists utilize more effectively the various library services which are available from the American Hospital Association and the Division of Hospital Pharmacy of the American Pharmaceutical Association and the American Society of Hospital Pharmacists.

Bulk Compounding and Sterile Products

1. The major objective of a bulk compounding program in the hospital pharmacy is to provide a broader scope of service by making available to patients products not commercially available. Secondly, financial savings may be realized from the preparation of commercially available products. A logical sequence for planning a bulk compounding program was presented.

2. Techniques, essential equipment and control procedures for preparing sterile injectables and sterile irrigating fluids were discussed.

3. The clinical needs in ophthalmology require cooperation of the pharmacist in preparing special sterile eye medications needed for the patient. Techniques for preparing ophthalmic medications included

a discussion of equipment required, agents used, and suggested procedures.

4. A number of dermatological formulas were made available.

5. Selected tours of several hospitals were conducted in the evening.

Education and Information

1. Pharmacists were encouraged to participate more actively in inservice training programs, particularly with reference to teaching pharmacology to student nurses and presenting lectures on new drug developments to graduate nurses and the medical resident and intern staffs. Methods of presenting these lectures were discussed.

2. Pharmacy bulletins or newsletters are serving as useful tools in disseminating information about pharmacy policies, procedures, new drugs, etc., to the hospital staff. Suggestions were offered on the preparation, content, format, costs and distribution of the pharmacy bulletin.

3. The Joint Commission on Accreditation of Hospitals strongly recommends (Bulletin No. 16) that hospitals establish Pharmacy and Therapeutics Committees. Function, organization and operation were discussed by the Director of The Joint Commission on Accreditation of Hospitals and two practicing pharmacists. Specific points were presented to assist the hospital pharmacist to foster more effective Pharmacy and Therapeutics Committee meetings. Emphasis was placed upon broadening the scope of activities of the Committee.

4. Effective supervision of pharmacists and nonprofessional personnel is essential in order to minimize errors in dispensing drugs. Methods for improving supervision through job descriptions, outlining responsibilities and continuing inservice training programs were explored.

5. The chemical, pharmacological and therapeutic effects of newer drugs were presented to assist the pharmacist in improving drug information service to physicians and nurses.

6. An administrator, a controller and a pharmacist examined and dramatized a pharmacy budget meeting. The participants discussed pertinent factors to be considered in preparing the pharmacy budget.

7. A question and answer session was held in which members presented questions regarding specific problems from their own departments. Members of the faculty offered solutions to these problems.

Dispensing

1. Increased usage of disposable products in the hospital was discussed. Particular emphasis was placed on central sterile supplies and single-unit pharmaceutical dosage forms. Some advantages of disposable

Sister M. Rebecca presents award to Sister Mary Jeanette at C.H.A. Institute

C.H.A. Institute Luncheon for enrollees and faculty. Shown at the Speaker's Table, left to right are Sister M. Rebecca, Sister Mary Jeanette, Dean Andrew Bartilucci, Dr. Robert P. Fischelis, Mr. M. R. Kneifl, Mr. Paul Parker, Sister Mary Oswalda, Mrs. Robert Bogash, and Robert Bogash

Sister Gonzales calls an informal session for advice about establishment of an internship program—Chicago Institute

John Diggs, hospital pharmacist, and Mrs. Diggs, entertain Chicago Institute enrollees with an operatic aria

pharmaceutical products are to increase accuracy in dosage, to minimize incidence of cross-infections and to save nursing personnel time.

2. Factors considered essential for the improvement of drug dispensing service include fixing responsibility for dispensing procedures; effective communications for the proper interpretation of medication orders; the necessity for dispatch; standardization procedures; and safety control procedures.

3. Methods for developing a system of prepackaging drugs in the hospital pharmacy were described. Some of the factors considered were the sequence, precautions to be taken, advantages and practicality in different size hospitals.

4. The extent of responsibility which the pharmacist would assume with particular regard to labeling, checking and other safety procedures to minimize the possibility of medication errors was outlined.

Expansion and Special Services

1. Examples of extending and expanding pharmacy services to other departments were discussed. An understanding and insight of department needs are essential if the pharmacy is to progressively undertake and provide new services to these areas.

2. Around-the-clock pharmacy coverage, as an extension of service, was discussed. Methods for providing such a service were described. The pharmacist-on-call system was offered as a solution to the problem. Emphasis was placed on the need for tailoring the service to meet the needs and conditions of the particular hospital involved.

3. A stepwise procedure for introducing and establishing new pharmacy services was discussed.

Clinic Sessions

Clinic Sessions were held daily for one hour following the formal program presentations. Small groups composed of approximately 12 pharmacists from hospitals of similar bed capacities discussed the program in terms of its application to their own hospitals. Faculty members participated in the clinic sessions only as resource advisers and by the invitation of the groups.

A clinic session leader was selected to coordinate the discussions of each group. In most instances the clinic session leaders had not attended an institute previously and their assignments provided the opportunity to develop leadership. Upon selection as a clinic session leader the purposes of the small group discussions were explained to each leader. They met with the institute coordinators and other advisers during lunch each day to study techniques for coordinating the discussions. Each clinic session leader then reported to the institute coordinator after each session to review the topics discussed and evaluate his coordination of the discussions.

A final session was held on Friday morning before the entire student body, with coordinator acting as moderator and the discussion leaders as participants.

Members of the faculty represented several fields of the hospital health team. In some instances speakers from industry or other fields of interest participated in order to most objectively develop a subject. Most hospital pharmacy leaders who served on the faculty

Clinic Session leaders meet with Institute coordinator daily—Chicago Institute

lived in the dormitories with the students throughout the week so that they could become acquainted and informally discuss hospital pharmacy problems.

The members of the faculty met daily to discuss methods by which the program could be improved for future institutes. These meetings also were valuable to assist the coordinators in serving the students' needs throughout the week. A special luncheon concluded each institute at which selected students representing various fields of interest in hospital pharmacy were asked to make short statements concerning their impressions of the institute and its value to them. It was stimulating to hear the comments which these students made. One young lady said that although she had not found the answer to the problems in her department, she did learn some new techniques to solve the problems. Others indicated that by attending the institute they were stimulated to make an entirely new approach to the practice of hospital pharmacy.

Following the institutes, a letter was received from a chief pharmacist which read: "My staff pharmacist came home from the Institute so full of enthusiasm that he arrived forty-five minutes early Monday morning. Powerful things, these Institutes! Seriously though, by the end of last week he had planned a mast head for our department newsletter and written the rough copy for its contents."

The week held a variety of experiences and interests. Such was the Monday evening social hour in Chicago. The program of volunteer talent consisted of unique humor by the master of ceremonies, Arthur Bernstein, from the Legal Department of the American Hospital Association; John Diggs, a hospital pharmacist from Pittsburgh, sang operatic arias with accompaniment provided by his wife, Princess; a ballet team from the A.H.A. staff, and group singing led by anyone who had the nerve to get behind the microphone. A square dance arranged by the Greater Philadelphia Society of Hospital Pharmacists was the counterpart at the Philadelphia Institute.

Student Participation

The enthusiasm and cooperation of the students contribute so much to the hospital pharmacy institutes that the full value can only be understood by actual participation. From the moment the students began arriving on Sunday afternoon until the goodbyes were said the following Friday afternoon, there was always a feeling that there was insufficient time to get everything done. The frustration began with the difficulty in remembering the names of all the people to whom you were introduced at the opening coffee hour on Sunday, and continued as one thought at the closing luncheon on Friday that there were so many other people with whom you would have liked to have gotten better acquainted. And woven through the atmosphere of cooperation and working together during the entire week was a continuous thread of interest in developing better pharmaceutical service—hospital pharmacy has some important potentials that I had never discovered previously—problems in the operation of my department are commonplace and they will be improved by the application of better methods of communication—that should be a valuable source of information—I think I'll try this idea in our hospital.

C.H.A. Institute

Greetings were extended to the 50 lay and religious hospital pharmacists who attended the tenth Catholic Hospital Association Institute on Hospital Pharmacy by Dr. Robert P. Fischelis, Secretary of the American Pharmaceutical Association, Mr. Robert Bogash, President of the AMERICAN SOCIETY OF HOSPITAL PHARMACISTS, and Sister Marian, S.C., President of the New Jersey Society of Hospital Pharmacists.

During the business meeting a resolution approving the formulary service of the AMERICAN SOCIETY OF HOSPITAL PHARMACISTS was adopted and it was requested that the Catholic Hospital Association encourage its adoption by all its member hospitals. Also Sister M. Aurita, St. Vincent's Hospital, Billings, Montana was named the new member of the Pharmacy Committee.

The program was developed by the Pharmacy Committee in cooperation with the C.H.A. headquarters staff. Dr. Charles A. Walton from the Department of Materia Medica at the University of Kentucky in Lexington discussed the "Pharmacological Principle in Hypertensive Therapy." A panel on "A Hospital Pharmacy Safety Program" was moderated by John Zugich, Assistant Director of the University of Michigan Hospital. Mr. Bogash moderated a panel on "The Economics of Hospital Pharmacy."

Papers included a presentation on poison control centers by Dr. Morton Rodman, a pharmacologist at Rutgers University; one on the formulary system by Dr. August Groeschel, Associate Director of Professional Services at New York Hospital; the Antibiotics Committee of the Medical Staff by Sister M. Rebecca, chairman of the C.H.A. Hospital Pharmacy Committee. In addition, there was a panel on assays and controls which was moderated by Sister M. Florentine, C.S.C., Chief Pharmacist, Mount Carmel Hospital in Columbus, Ohio.

At a luncheon for the students and faculty members Sister Jeanette, O.P., Chief Pharmacist at Mary Immaculate Hospital, Jamaica, Long Island, N. Y. received an award for 50 years in hospital pharmacy practice. Also, Dr. Fischelis presented a National Pharmacy Week award to Sister Oswalda of St. Joseph's Childrens and Maternity Hospital, Wilkes Barre, Pennsylvania.

Therapeutic Trends

edited by WILLIAM JOHNSON

Studies With Streptovarcin In The Tuberculous Guinea Pig

Streptovarcin has been reported to have good *in vitro* activity against both virulent and saprophytic mycobacterium. Rhuland and associates indicated that streptovarcin is able to protect mice infected with *M. tuberculosis,* var. *hominis* and *M. tuberculosis,* var. *bovis.*

Stern, Gray, and Rhuland studied the effectiveness of streptovarcin in guinea pigs infected with *M. tuberculosis,* var. *hominis.* The studies reported in *Am. Rev. Tuber.* 77:976 (June) 1958, show streptovarcin is therapeutically effective in oral doses of 50 and 100 mg. daily. The effect was shown by relative infrequency of progressive lesions in lymph nodes, lungs, livers, and spleens of infected animals. In a sixty-two day test a 50 mg. dose of streptovarcin had a therapeutic effect comparable to that of 5 mg. of isoniazid or 15 mg. of streptomycin.

R. HARRISON

6-Methylprednisolone—Topical Ointment

In *Antibiot. Med. & Clin. Ther. 5*:372 (June) 1958, Golbert reports the results of a study in which the cutaneous efficacy of 6-methylprednisolone ointment was observed. The ointment in concentrations of 0.1, 0.25, and 0.5 percent was applied locally to 342 patients with varying types of skin diseases. The 0.5 percent strength ointment proved superior, although the 0.25 percent ointment produced excellent results also. The ointment, noted for its dramatic anti-inflammatory and localized antipruritic effect, is most useful in subacute and chronic dermatitis. It should not be used in acute, weeping, or secondarily infected dermatological condition. No untoward local or systemic reactions were apparent except in two instances which involved localized burning. 6-Methylprednisolone ointment is an excellent adjunct to dermatological conditions and may prove useful in problem cases now resistant to older and accepted steroid preparations. The 6-methylprednisolone ointment for this study was supplied by the Upjohn Co. as Medrol ointment.

SYLVIA SCHMIDT

Hexafluorodiethylether—Pharmoconvulsive Agent

As a result of the investigation of the anesthetic properties of low molecular weight aliphatic fluorinated ethers, hexafluorodiethylether (CF_3CH_2-o-CH_2CF_3) was found to elicit violent convulsions upon inhalation. Rats exposed to this vapor in concentrations as low as 30 p.p.m. (wt./vol.) convulsed violently in 30 seconds. The clonic and tonic seizures stopped promptly when the agent was removed from the inspired air.

Four patients suffering from mental disturbances in which electroshock therapy was indicated were subjected to hexafluorodiethylether. Volumes of one to three ml. were placed in a plastic nostril inhaler. With the inhaler in one nostril, convulsive seizure ensued within one to three minutes and continued two to four minutes until withdrawn. All four patients recovered with no untoward effects with two of the patients assuming a more cooperative attitude. Hexafluorodiethylether, therefore, may prove useful in shock therapy because of its harmless nature, rapid onset of seizure, ease of control of depth and duration of seizure, and similarity of cortical dysrhythmia to that evoked by Metrazol. These results were described in *Anesth. & Analg. 37*:152 (May-June) 1958 by Krantz and Truitt. The material for this study was supplied by Research Labs., Air Reduction Co., Inc.

SYLVIA SCHMIDT

Tochergamine—A Synthetic Ergot-Like Derivative

Tochergamine, NN-Diethyl-N′-(2-tetralyl)-glycinamide, is a substance reported to be of high oxytocic activity. Clinical trials by Bertini in Turin and Rodriguez-Bravo in Rome suggest that tochergamine, in parenteral doses of 2 to 6 mg., promotes easy and quick retraction of the uterine musculature after delivery and that it reduces the incidence of post-partum hemorrhage.

A study by Garrett and Embrey does not support the findings of the above mentioned investigators. They report that tochergamine, when tested on the intact human puerperal uterus, was found to be without demonstrable activity in doses of from 1 to 20 mg. Tochergamine was given by intravenous injection to 6 volunteer patients in doses from 1 to 20 mg. (the recommended dosage range being from 2 to 6 mg.) and in none of these patients was an oxytocic response recorded, either immediate or delayed, and no side effects were observed. Tochergamine has been found to act as a powerful oxytocic agent in laboratory animals but other experiments do not show it to have a demonstrably useful effect on the human

uterus. It is pointed out that the variations in the results obtained are probably because of differences in techniques. The results of this study are reported in *J. Pharm. Pharmacol. 10*:325 (May) 1958 by Garrett and Embrey and the tochergamine was supplied by Dr. Bovet of Rome.

W. E. HERSHBERGER

Azacyclonal—Intravenous Use

The use of azacyclonal, intravenously, in 30 patients is reported. Nineteen of these patients were male and eleven female and their ages ranged between 14 and 86 years. Azacyclonal both via the intravenous and the oral route, was well tolerated by all patients. No serious side effects or toxic complications were encountered, except for the fact that some of the patients complained of an unpleasant and bitter taste while taking the drug orally. There was no evidence of a hypotensive effect. In all these patients the confusion and disorientation as well as the hallucinations and delusions disappeared within a very short time after a course of azacyclonal had been instituted. The drug certainly produced a dramatic "melting away" of the psychoses. Intravenous azacyclonal was used successfully in 26 out of 30 patients, being most effective in senile confusional states, postoperative psychosis, toxic psychosis, and acute schizophrenic reactions. No side effects were observed and it can be considered a very safe drug which appears to be specific for the treatment of acute psychotic and acute confusional states, regardless of the underlying causes or psychopathology. This study was reported in *Northwest Med. 57*:620 (May) 1958.

W. E. HERSHBERGER

Isolation Of New Fractions Of Antitumor Mitomycins

In 1956 a new actinomyces strain named *Streptomyces caespitosus* produced new antibiotic mitomycins that had extraordinarily strong activity against various microbes and Ehrlich ascites tumor cells. First were A and B fractions which were not isolated at all in the purified product, but a new bluish violet fraction which tentatively called Mitomycin X was abundantly isolated. Fraction X has been renamed Mitomycin C. Besides Mitomycin C, various crystals and syrupy pigments were isolated from the broth at the same time. Among these fractions were a yellow crystalline substance (tentatively named fraction Y) and a red oily syrup (tentatively named fraction R) both of which have bioactivity. Mitomycin C is very stable to heat in the crystalline state. Fraction R is the only one that exhibits activity against Ehrlich mice cancer but no activity is exhibited against microbes. Fraction R is a brownish-red, amorphous powder and Fraction Y is a red oily syrup, changing to brown at 180°C., and carbonizing at 240°C. Fraction Y is closely related to Mitomycin B. The above study was reported in *Antibiot. Chemother. 8*:228 (May) 1958.

W. E. HERSHBERGER

Orphenadrine In The Treatment Of Depression

Orphenadrine hydrochloride, which was recently released and intended for use in Parkinson's disease, was found to have as a side effect a euphoric action. Robitscher and Pulver tested this side effect in cases of depression in a small group of psychiatric patients. In the study, 14 patients were treated 12 of which were hospitalized psychiatric patients and 2 were outpatients with depressive features. The patients were selected from hospital patients, admitted routinely, to a public urban hospital. These patients exhibited symptoms of, or complained of, depression and fatigue. The chief criterion for selection of the patients was that they were all being considered for electroshock therapy. Two of the patients were rated recovered and 9 showed beneficial effects, including improved behavior, more optimism concerning the future, decreased anxiety and agitation. Further studies with adequate controls and double blind technique are warranted to determine if orphenadrine can prove useful in the treatment of depressed psychiatric patients. These results were reported in the *Am. J. Psychiat. 14*:1113 (June) 1958.

R. HARRISON

Hexadecadrol—Anti-Inflammatory Corticosteroid

In *Calif. Med. 88*:417 (June) 1958, Bland reports on the use of four new hydrocortisone derivatives. These four compounds are: 16a-methyl-9a fluoroprednisolone (MK-125 or hexadecadrol); 16a-methyl-9a-fluorohydrocortisone (MK-126); 16a-methylprednisolone (MK-110); and 16a-methylhydrocortisone (MK-117). Results gathered from laboratory animals have indicated a striking augmented anti-inflammatory potency without a corresponding disturbance of electrolyte metabolism. The anti-rheumatic potencies of these compounds in humans, compared with prednisolone and determined by milligram dosages are as follows: MK-125 is 7 times more potent; MK-126 is 3 times more potent; MK-110 is one-third more potent; and MK-117 is 70 percent as potent as prednisolone. MK-125, the most potent of these compounds, has been given in daily doses of from 0.6 mg. to 2.8 mg. daily over a four month period. In a group of 86 patients with rheumatoid arthritis now being treated with MK-125, the average dose is 1.6 mg. daily. The therapeutic efficacy of the compound in long-term administration is now being studied. The corticosteroids for the study were supplied by Merck Sharp & Dohme Research Labs.

SYLVIA SCHMIDT

Timely Drugs

Delvex

CHEMICAL NAME: Dithiazanine iodide; 3,3′-diethylthiadicarbocyanine iodide, a blue polymethine dye (also known in foreign countries as Telmid, Partel, and Anelmid).
INDICATIONS: Broad-spectrum anthelmintic, effective against whipworm, intestinal threadworm, large roundworm, and pinworm; partially effective against dwarf tapeworm and beef tapeworm. No purgatives, enemas, laxatives, fasting, or special diets are required.
SIDE EFFECTS AND CONTRAINDICATIONS: Infrequent, mild, and transient; no contraindications have been noted.
DOSAGE: Adults and children over 60 pounds, 0.6 Gm. daily divided into three doses, for 10 to 14 days for strongyloidiasis, and 5 to 10 days for multiple infections, ascariases and trichuriases; in enterobiasis, 0.3 to 0.6 Gm. is sufficient to eliminate parasite completely in 5 days.
PREPARATIONS: Tablets of 50 mg., 100 mg., and 200 mg.
PACKAGING: 50 mg. tablets in bottles of 50, and 100 mg. and 200 mg. tablets in bottles of 50 and 1,000.
SUPPLIER: Eli Lilly & Co.

Epitrate

COMPOSITION: Sterile, stabilized solution containing *l*-epinephrine bitartrate, in a vehicle having a low surface tension.
INDICATIONS: For clinical management of uncontrolled chronic simple (open or wide angle) glaucoma either alone, or preferably in combination with miotics.
SIDE EFFECTS AND CONTRAINDICATIONS: Should never be used in angle closure (narrow angle) glaucoma because of danger of precipitating an acute attack of glaucoma; should an elevation of intraocular tension follow instillation, acetazolamide should be administered orally (0.5 Gm.) or intravenously (0.25 Gm.); transitory stinging or pain may occur, but disappears after a few weeks of therapy.
DOSAGE: One drop in eye every 10 to 20 minutes for 3 doses; maintenance dose may be as little as one drop every 2 to 3 days.
PREPARATION: Ophthalmic solution containing *l*-epinephrine bitartrate 2%, chlorobutanol 0.5%, and sodium bisulfite 0.3%.
PACKAGING: Sealed, sterile dropper bottles of 7.5 ml.
SUPPLIER: Ophthalmos, Inc., Div. of Doho.

Lycinate

COMPOSITION: Diiodohydroxyquin, sodium lauryl sulfate, dioctyl sodium sulfosuccinate, and aluminum potassium sulfate.
INDICATIONS: Vaginal tablets intended as an aid in treatment of vaginal infection due to *Trichomonas vaginalis* or bacterial pathogens.
SIDE EFFECTS AND CONTRAINDICATIONS: During latter months of pregnancy, physician should insert tablets.
DOSAGE: Adults, 2 tablets inserted high into vaginal vault once daily; in trichomoniasis, treatment should be continued until three monthly vaginal smears are negative for trichomonads.
PREPARATIONS: Vaginal tablets containing diiodohydroxyquin 100 mg., sodium lauryl sulfate 5 mg., dioctyl sodium sulfosuccinate 5 mg., aluminum potassium sulfate 14 mg., lactose 380 mg., and anhydrous dextrose 650 mg.
PACKAGING: Boxes of 50 tablets with applicator.
SUPPLIER: Lloyd Brothers, Inc.

Megimide

CHEMICAL NAME: *b*-Ethyl-*b*-methylglutarimide.
INDICATIONS: Barbiturate intoxication, and barbiturate and thiobarbiturate anesthesia.
SIDE EFFECTS AND CONTRAINDICATIONS: Overdosage may result in convulsions, for which thiopental (Pentothal) sodium is specific antidote.
DOSAGE: Intravenously in intermittent doses of 50 mg., every 3 to 5 minutes, in barbiturate intoxication, until return of muscle tone, and pharyngeal and laryngeal reflexes.
PREPARATIONS: 10 ml. ampuls containing 50 mg.
PACKAGING: 10 ml. ampuls.
SUPPLIER: Abbott Laboratories.

Mincard

IMPORTANT NOTICE: Formerly known as Mictine.
GENERIC NAME: Aminometradine.
INDICATIONS: Diuretic.
DOSAGE: Daily, 0.2 to 0.8 Gm., on interrupted schedule.
PREPARATIONS: Tablets of 0.2 Gm.
PACKAGING: Bottles of 1,000 tablets,
SUPPLIER: G. D. Searle & Co.

Paraflex

GENERIC AND CHEMICAL NAMES: Chlorzoxazone; 5-chlorobenzoxazolinone.
INDICATIONS: Skeletal muscle relaxant.
SIDE EFFECTS AND CONTRAINDICATIONS: Occasionally, gastrointestinal or central nervous system effects, seldom severe enough to require discontinuation of drug.
DOSAGE: Adults, 250 mg. 3 or 4 times daily; Children, 125 to 500 mg. 3 or 4 times daily depending upon age and weight.
PREPARATIONS: Tablets 250 mg., scored.
PACKAGING: Bottles of 50 tablets.
SUPPLIER: McNeil Laboratories, Inc.

Vita-Metrazol

COMPOSITION: Pentylenetetrazol (Metrazol) and vitamins.
INDICATIONS: In mental deterioration of aged characterized by depression, apathy, confusion, and other behavioral disorders.
DOSAGE: Usually, 2 teaspoonfuls 3 or 4 times daily; for severely regressed patients, 3 teaspoonfuls 3 times daily; maintenance, 1 teaspoonful 3 or 4 times daily.
PREPARATIONS: Wine-like flavored elixir containing 15% alcohol and sucrose (supplying 11 calories per teaspoonful), and containing in each 5 ml.: pentylenetetrazol 100 mg., thiamine hydrochloride 1 mg., riboflavin 1 mg., niacinamide 10 mg., pyridoxine hydrochloride 1 mg., and panthenol 2 mg.
PACKAGING: Bottles of 16 ounces.
SUPPLIER: Knoll Pharmaceutical Co.

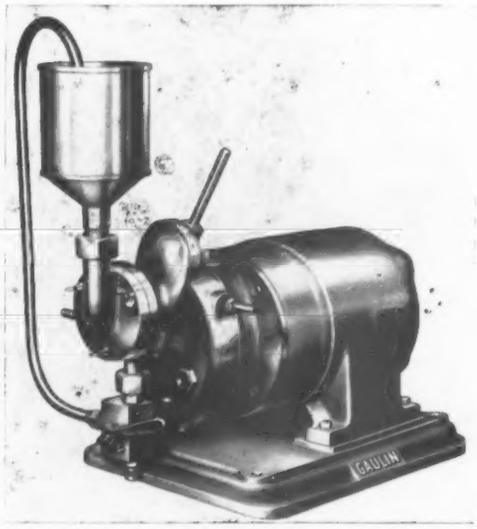
Notes & Suggestions

edited by CLIFTON J. LATIOLAIS

COLLOID MILL

A new two-stage colloid mill has been announced by Manton-Gaulin Manufacturing Company, Inc. of Everett, Massachusetts. It features a special design, incorporating removable rotor, stator and rotary shaft seal. This is said to simplify operating, speed change-over and cleaning, and eliminate shaft leakage.

The Gaulin RE Colloid Mill provides a micrometer gap setting which is adjustable while running (gap setting 0.001-0.040). The mill body is water-jacketed for either heating or cooling. All mill parts coming in contact with the product are of 18/8 stainless steel; the only exception being the Rotor and Stator which can be furnished in stainless, tungsten carbide, ceramic, alundun and other special materials.



Applications include processing of emulsions, lotions, creams, dispersions, suspensions, etc. The price of a Model 2A Colloid Mill, complete with 3-way valve by-pass tubing and one quart tank is $936.00 F.O.B. Everett, Mass. Additional details of the RE Colloid Mill are included in Bulletin C-56, available from the company upon request.

TETRACYCLINE LOTION

The following lotion, used in the local treatment of furunculosis (boils), was reported by H. J. Bernhardt in *Antibio. Med. Clin Ther.* 4:493 (Sept.) 1957. The lotion was preferred to an ointment because it is not occlusive and does not interfere with the normal relationship of the skin to external environment.

Tetracycline	2.4 Gm.
Zinc Oxide	18.0 Gm.
Talc	18.0 Gm.
Glycerin	24.0 Gm.
Bentonite	12.0 Gm.
Distilled Water, to make	240.0 ml.

CHLORPHENIRAMINE ELIXIR

The following formula of an antihistamine elixir was developed and reported by Barr and Tice in the October 1957 issue of the *American Journal of Pharmacy,* page 358:

Chlorpheniramine Maleate	0.4 Gm.
Benzaldehyde	0.1 ml.
Vanillin	0.2 Gm.
Amaranth Solution	1.0 ml.
Alcohol	100.0 ml.
Sorbitol Solution	450.00 ml.
Purified Water, to make	1000.0 ml.

Dissolve the chlorpheniramine maleate in 400 ml. of water. Add the benzaldehyde and vanillin (previously dissolved in the alcohol), the sorbitol solution, amaranth solution, and add enough water to make 1,000 ml. Mix well and filter.

The authors report that no additional preservative (other than the alcohol present) is needed since the product does not support the growth of microorganisms. The *p*H of the final product is 5.3 to 5.5.

RESERPINE INJECTION 2.5 MG./ML.

Reserpine USP	0.250 Gm.
Benzyl alcohol USP	2.0 ml.
Citric Acid, anhydrous USP	0.25 Gm.
*Polysorbate 80 USP	10.0 ml.
Water for injection USP, to make	100.0 ml.

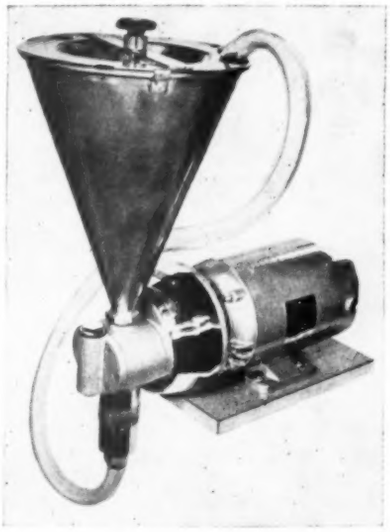
Dissolve reserpine and citric acid in benzyl alcohol (with slight heat). Add polysorbate 80 and water for injection and mix thoroughly. Sterilize the solution by bacterial filtration using a 0.3 Selas candle and fill into sterile Type I ampuls or vials. (*J. Am. Pharm. Assoc. (Sci. Ed.)* 45:773 (Dec.) 1956). This preparation is for intramuscular use.

*Tween 80—Atlas Powder Company, Wilmington, Del.

HOMOGENIZER, ULTRASONIC

The Minisonic* laboratory and small batch homogenizer is a British-made unit which utilizes the ultrasonic wave technique for emulsification and dispersion. The capacity of the Minisonic is one gallon; whereas the Rapisonic is a larger unit for bulk quantities.

The Minisonic is a self-contained unit—no premixing of ingredients is necessary. The continuous phase of an emulsion is introduced into the outer funnel and re-circulated via the vibrating element while the disperse phase is taken up from the inner funnel at regulated speed. The progress of emusification can be observed through the transparent hose and the finished emulsion is discharged by the same flexible hose. If the emulsion is pre-mixed, it can



be homogenized by using the other funnel without the inner one.

A gallon of emulsion can be prepared in only one to two minutes. The Minisonic forms a completely closed system and once the air originally in the machine is purged, no air will be incorporated. It utilizes only a ½ H.P. motor.

*Sonic Engineering Corporation, 146 Selleck St., Stamford, Connecticut

FILLING MACHINE, HAND OPERATED

The Flexifiller* semi-automatic filling machine is designed to fill collapsible tubes, jars, tins, bottles, or polyethylene containers. Bottles can be filled at a speed of up to 20 per minute. It will handle pastes or creams ranging from highly viscous materials such as ointments down to a mobile liquid. Uniform motion imparted by the motor ensures accurate volumetric filling. The unit is driven by a fractional electric motor of ⅛ H.P. Dimensions are 18½" x 11½" x 14½" (without hopper).

All contact parts are made of stainless steel. The standard hopper holds 3½ gallons but a six gallon capacity is also available.

Pumps are interchangeable thereby allowing different amounts of material to flow per stroke. Nozzles are likewise interchangeable making it adaptable for different size bottles, or jars.

*Flexile Metal Company, Ltd., 796 Holloway Road, London N.19, London

BOTTLE CRUSHER

The Vis-O-Lite (Model BC-50) bottle crusher* facilitates the disposal of bottles and glassware. As the glass is tossed into the hopper it is automatically

crushed and deposited into a sealed, steel receptacle ready for disposal. It accepts bottles or jars up to 5" in diameter. The Crusher is equipped with a ¼ H.P. 110V. electric motor. The lid diameter is 20⅜". Priced at $179.50 f.o.b., St. Louis.

*The Vis-O-Lite Company Inc., 128 Sidney Street, St. Louis 4, Missouri

THE LAW of hospital pharmacy

edited by GEORGE F. ARCHAMBAULT

► THREE ITEMS OF PARTICULAR INTEREST AT THIS TIME to hospital pharmacists are: (a) The recent action taken by the U. S. Department of Health, Education, and Welfare, Food and Drug Administration relative to regulating the *location of expiration dates on labels* of drug packages. The regulation as appearing in the Federal Register of July 16, 1958 reads as follows:

"3.507 *Location of Expiration Date in Drug Labeling.* Drugs which require an expiration date should show the expiration date on the immediate container. When the immediate container is packaged in an individual carton, the expiration date should also be placed on the carton. When single dose containers are packed in single cartons, the expiration date may properly appear on the carton only. (Secs. 505, 506, 507, 52 Stat. 1052, as amended 55 Stat. 851, 59 Stat. 463, 61 Stat. 12, 63 Stat. 409; 21 U.S.C. 355,356, 357).

This new labeling procedure should aid materially in the proper control and storage of these items.

(b) The case of the student nurse which attracted nation-wide attention in the public press recently, a case where the nurse *administered* 3 fluid ounces of paraldehyde for an ordered 2 fluid drams. Some pharmacists in commenting on the tragedy confused the issue by considering the act one of drug *dispensing*. This is incorrect. This was an unfortunate accident in the area of *drug administration*, a proper nursing function as all hospital pharmacists know. Because of this and similar case situations, it is of considerable importance that leaders in the specialty of hospital pharmacy be well informed on the differences between drug dispensing (a pharmacy act) and drug administration (a nursing act). The more detailed knowledge we have on this subject, the better prepared we will be to discuss these matters with those in the other specialty areas of pharmacy and hospital administration. (See July 1958 issue of the JOURNAL (p. 593) for more details on this subject.)

(c) The State of Nebraska has recently issued, through its Department of Health, rules and regulations covering the practice of pharmacy. Pharmaceutical services in hospitals are specifically included in these rules and regulations. One of the readers of this column, a hospital pharmacist from Alabama has requested that the Column cover individual State laws and regulations on the practice of pharmacy in hospitals. This column will attempt to do this on a state by state basis in the near future.

Manslaughter

May a pharmacist be held for manslaughter in the event of a death resulting from the improper compounding or dispensing of a medication? A recent California case decision reveals the law of that state on this matter.

In People *vs.* Stuart, 302 P. (2d) 5 (Calif. Oct. 1956), a pharmacist filled a prescription for Sodium Phenobarbital, grs. eight; Sodium Citrate, drams three; Simple Syrup, fluid ounces two; Aqua Peppermint, fluid ounces one and Aqua Distillate Q.S. Ad. fluid ounces four. He dispensed 3 drams of a powder from a bottle labeled "Sodium Citrate." The material dispensed from the bottle was found to be Sodium Citrate and Sodium Nitrite. As a result, a child aged eight, died.

In the lower court and the District Court of Appeals the pharmacist was convicted of manslaughter. However, the California Supreme Court stated that in order to be guilty of manslaughter, a criminal intent must be shown. If, continued the Court, the person who committed the act or made the omission charged, was acting under ignorance, or mistake of fact, he has no criminal intent and is incapable of criminal negligence. This is also true, the court stated, of persons who commit an act through misfortune or by accident, when there appears that there was no evil design, intention or culpable negligence. The judgment or conviction was reversed by this Court holding that the defendant acted with due care and caution and not ignorantly. The Court further stated that the defendant had the right to rely upon the fact that the bottle marked Sodium Citrate did in fact contain Sodium Citrate and not something else.

Common law manslaughter in the United States is usually defined as a homicide committed without justification or excuse and without malice. Voluntary manslaughter is homicide in heat of passion caused by provocation reasonably exciting passion, such as assault, killing in mutual combat. Involuntary manslaughter is homicide that results from the doing of an unlawful act, not amounting to a felony, and not of such a nature as to cause a reasonable apprehension of causing death, or where it results from reckless or wanton acts. Common law manslaughter in Maryland, for example, is a felony and carries a 10 year maximum sentence, while statutory manslaughter such as manslaughter by automobile is a misdemeanor and carries a three year sentence. In the California case, *Pharmaceutical manslaughter* as well as *Common law manslaughter* was carried in the indictment. In arguing the case before the California Supreme Court, the Attorney won his reversal of a conviction of *manslaughter* by the lower court by arguing that pharmacy is a profession not unlike medicine or law. "A pharmacist can no more be guilty of manslaughter if an error (without intent or negligence) results in death, than can a District Attorney or Judge in a lower court be held for false imprisonment after a higher court has reversed a conviction," the Attorney argued. The District Attorney had based his case on the theory (1) that the pharmacist was the absolute insurer of what he delivered and if anyone died as a result of a prescription, he was guilty of manslaughter, and (2) that selling an admittedly adulterated drug which resulted in a death was an unlawful act and hence the pharmacist was subject to a charge of manslaughter under California law. In the Appellate Court, a reversal of the *Pharmaceutical manslaughter conviction* was obtained and in the Supreme Court the *manslaughter* charge conviction of the lower court and upheld by the Appellate Court was reversed.

The information cited in this column is not to be construed as legal advice. Specific legal problems like specific disease conditions require the services of a specialist grounded in the fundamentals of the problem, its recognition and solution. Consult a member of the local Bar for advice on specific local problems.

SELECTED PHARMACEUTICAL ABSTRACTS

and summaries of other articles interesting to hospital pharmacists

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edited by CLIFTON J. LATIOLAIS *and* LEO F. GODLEY

SIGNAL TO INDICATE STERILIZING TEMPERATURE

An Apparatus to Signal the Beginning of Sterilization, Arlashin, M. I., Aptechnoe Delo (U.S.S.R.) 7, 3:38 (May-June) 1958.

Since determination of the time at which the inside of the sterilizer reaches the temperature required for sterilizing the inserted objects is of very great importance, it is a common practice to use indicators at the beginning of the sterilization. However, the indicators used up to the present in Soviet pharmacies, *e.g.* contact mercury thermometers and bimetallic thermometers, have been found disadvantageous in many respects.

In view of these facts the author proposes to employ a new device for signaling the sterilizing temperature. Its principle consists in the use of a metal, the melting point of which is near 100°C. By suitable arrangement of an electric circuit, a bell is made to ring the moment the metal melts. Thus the sterilizing temperature is indicated acoustically. It has been found that after the acoustic signal is given, the exact 100°C temperature is arrived at within 2 to 3 minutes, while heating with medium intensity. This time is to be added to the sterilizing time prescribed by the pharmacopoeia.

HUBERT ZACEK

ALGINATE MUCILAGES, FACTORS AFFECTING VISCOSITY OF

The Variation of the Viscosity of Alginate Mucilages Caused by Different Physical-Chemical Factors, Bolliger, Von Rosmarie and Munzel, K., Pharm. Acta Helv. 33:225 (June) 1958.

The apparent viscosity values of mucilages with the same proportional content of sodium alginate rise with the degree of polymerisation.

The apparent viscosity values rise sharply (of the order of P^{10} to P^{100}) on a small increase of the alginate concentration only.

A maximum viscosity of *p*H 7 could be observed in a mucilage with 1.2% of Manucol SS/LM, a sodium alginate, which was adjusted to several *p*H values with an acid or a base respectively.

Investigations with substances capable of producing flocculation in a sodium alginate, beginning at a certain concentration, showed the following results:

a. Ethanol: Up to a certain concentration, ethanol causes an increase in the viscosity by an "incomplete flocculation," whereas in higher concentrations it leads to a coarsely dispersed flocculation of the alginate. If the alginate is suspended in the whole prescribed amount of ethanol and afterwards swelled by the addition of water, the dehydration which leads to flocculation occurs with a lower concentration than if the ethanol is added to the already fully hydrated alginate. The actual investigations with 1% Manucol SS/LM solutions showed in the first case flocculation of the mucilage with an ethanol content of 15% w/w and in the second case with approximately 25% w/w.

b. Glycerol: Alginates can be suspended in large amounts of glycerol and then made to swell by the addition of water, without causing flocculation. In the present investigation with 1% Manucol SS/LM solution, flocculation only occurred with a content of 70% w/w of glycerol. The viscosity of the mucilage rises with the glycerol content. This phenomenon is explained by the formation of numerous "glycerol bridges" between the chain molecules of the alginate; one glycerol molecule is bound on both sides to secondary hydroxyl groups of the alginate molecule by hydrogen bridges. This phenomenon is related to the gelation of pectin and alginates on the addition of sugar.

c. Moment of the addition of ethanol or glycerol alginate mucilages: The swelling with water is accelerated by wetting the dry alginate with small quantities of ethanol or glycerol respectively (about two to four times the weight of alginate). Larger quantities of ethanol or glycerol should be added to the sodium alginate after it has swelled completely (*e.g.* after 24 hours), because they are then able to stabilize the viscosity of the mucilage. When added at the beginning of the swelling, they may cause higher viscosity values by "incomplete flocculation," but in the course of several days these values fall below the low but more stable initial viscosity values of mucilages to which ethanol or glycerol has been added after the swelling.

d. Electrolytes: Investigations were made concerning the influence of increasing concentration of sodium chloride and sodium benzoate on the viscosity of the mucilages. If they are dissolved at low concentrations in the swelling water, these electrolytes raise the viscosity of the alginate mucilage by "incomplete flocculation." In higher concentrations, however, a coarsely dispersed flocculation occurs. The permissible concentrations of electrolytes are low—(in the present experiments with 1% Manucol SS/LM solutions of approximately 1% NaCl and approximately 2% sodium benzoate). However, if the electrolyte is added to the swollen mucilage, the viscosity values are lower, but flocculation occurs only at approximately 4% of NaCl.

e. Acids: Sodium alginate solutions may not be more acid than *p*H 4.1; otherwise the only slightly soluble alginic acid forms a precipitate. The specific *p*H of an alginate mucilage which lies between 6 and 7 only tolerates weak organic acids. While solutions of these are being added, the mucilage should be mixed and stirred thoroughly in order to avoid too low local *p*H values, causing precipitates of alginic acid which are difficult to dissolve afterwards.

AUTHOR'S SUMMARY

OILS AND FATS, DEGRADATION PRODUCTS OF

Studies on Some Degradation Products in Oils and Fats, Mihelic, F., Farmaceutski Glasnik 14:183 (May) 1958.

The paper deals with the relation between the formation of certain primary and secondary degradation products in fats and oils. Edible sunflower oil, pressed sunflower oil, extracted and unfiltered as well as extracted and filtered sunflower oil, and lard have been examined.

Experiments with lard have been also carried out on addition of 0.002% of the inhibitor NDGA, of the copper prooxidants (in form of copper soap) and of chlorophyll b, and of addition of a combination of 0.001% of NDGA and 0.001% of chlorophyll.

From the results obtained on examining oils and fats in the light and in the darkness the formation of the autooxidising degradation products could be compared. Autooxidising processes in samples of sunflower oil are slower in the darkness than in the light.

The sample of pure lard both in the light and in the darkness showed, in comparison with the samples of the sunflower oil, a slower addition of oxygen and a long induction period.

The experiments carried out with lard, both in the light and in the darkness, have shown that the light and the darkness respectively act differently upon the autooxidising processes either in the pure lard or in the lard with the inhibitor or with the prooxidizers.

The increase of peroxides in the control samples during the first 52 days was somewhat greater in the light than in the darkness.

In the sample of lard with NDGA less differences have been found both in the light and in the darkness.

Great differences were found in the samples of lard containing copper and chlorophyll, and the combination of NDGA and chlorophyll. A long induction period in the darkness was observed in the lard containing chlorophyll, while in the light the increase in peroxides is more rapid.

NDGA in the presence of chlorophyll acts only partly and within a small range as inhibitor. The autooxidising reactions become slower and slower, and are stronger in the darkness than in the light.

The increase in free fatty acids in the light and in the darkness is not characteristic so that there are no essential differences, except in the sample of lard containing copper.

During the experiment the percentage of free fatty acids increased differently. In the extracted filtered oil it increased after 288 hours to 3.18%. In the extracted unfiltered oil it increased up to 3.41% from the primary 3.15%. In the pressed sunflower oil the acid content increased after 336 hours to 3.69% from the primary 3.38%, and in the edible sunflower oil to 1.15% after 384 hours from the primarily 0.15%.

In the lard the free fatty acids have increased to 0.64% from the primary 0.11%.

A smaller increase in the peroxide content was found in the sample of lard containing chlorophyll, and in the sample of lard containing chlorophyll and NDGA than in pure lard. The peroxides increase to a maximum which was reached by all three samples over the same period of time, i.e. after 504 hours, after which the decrease began to take place.

AUTHOR'S SUMMARY

INJECTIONS, EFFECT OF CLOSURES ON STABILITY OF AQUEOUS

Comparison of the Stability of Some Aqueous Solutions in Ampoules and Multiple-Dose Containers Closed by Means of Polyvinyl Chloride or Rubber Caps, Nielsen, A. Brink, Dansk Tidsskr. Farm. 32:109 (June) 1958.

A short description is given of the most important literature on the evaluation of the suitability of different qualities of rubber as caps for multiple-dose containers.

Lately plastics have been used as caps for multiple-dose containers. A so-called "resistant cap" consisting of two parts sealed together, the bottom of polyvinyl chloride and the upper of rubber, is proposed.

The purpose of these experiments was to compare the effect of "resistant caps" and rubber caps on different aqueous solutions.

The two caps act as reducing agents in a solution of gold sodium chloride and a solution of potassium permanganate. The rubber caps are the strongest reducing agents. The content of gold sodium chloride was determined photocolorimetrically after reduction with stannous chloride. The content of potassium permanganate was determined by iodimetric titration as described in the Ph. Dan. 1948.

The liberation of hydrolytic substances in a solution of sodium riboflavine is only slight for both types of cap.

Substances, which are oxidizable, are most stable in solutions in contact with "resistant caps." There is a great deal of difference in the stability of ascorbic acid solutions in the different containers. The stability of solution of adrenaline and solution of sodium nitrite is similar in the various containers. Solution of adrenaline changes visually after ultraviolet irradiation to the greatest extent in those containers closed with rubber caps.

Substances are adsorbed to different degrees by the two caps. Sodium pyrosulphite is adsorbed to the greatest extent by the rubber caps, while phenol and chlorocresol (p-chlor-m-cresol) are adsorbed to the greatest extent by the "resistant caps."

The conclusion to be drawn from these and previous experiments is that the "resistant cap," with regard to physical properties, the liberation of substances in water, and in a number of solutions of drugs is much superior to the rubber cap, without, however, being the ideal cap. Some bacteriostatic phenols should not be stored in containers closed with polyvinyl chloride caps.

AUTHOR'S SUMMARY

MANAGERIAL EFFICIENCY, IMPLEMENTING DECISIONS TO IMPROVE

Get Action from Your Decisions, Dressner, H. R., Nation's Business 46:64 (July) 1958.

A procedure is outlined for helping executives boost their managerial efficiency. A busy executive may not necessarily be a productive one and motion in itself is not indicative of progress. In order to get action from decisions, emphasis must be placed on follow-through, which is a series of action steps necessary to carry a project to successful completion. Several basic principles should be followed.

First, take nothing for granted. Check assignments given to assistants and evaluate progress at intervals.

Second, formulate a plan. Constantly plan ahead so that following steps are as clear as the preceding ones. The plan must take into consideration possible alternatives.

Third, act promptly, but not impulsively. Delay may eliminate the chance to do anything at all. Don't let a good idea be sacrificed to the pressure of time.

Fourth, be determined to succeed. If you have confidence in your idea and plan, don't surrender without a good try.

Fifth, constantly keep a continuing inventory of what your goals are and what you are doing to accomplish them.

Sixth, keep all individuals well-informed. Therefore, choose the form of communication you feel will be most likely to succeed. Also, decide on specific content of the message, time and place.

Seventh, give credit to individuals for a job well done.

Follow-through is hard work, but its reward is the satisfaction of finishing a job.

ROBERT L. RAVIN

OINTMENT BASES, GELLING EFFECT OF THIXIN ON

An Evaluation of Thixin in Preparing a Series of New Ointment Bases, Gallelli, J., Bollo, R., et al, J. Am. Pharm. Assoc., Pract. Ed. 19:414 (July) 1958.

Thixin, a thixotropic agent containg 1-hydroxystearin, was investigated in the formulation of a series of ointment bases with cottonseed, linseed, expressed almond, and castor oils, and heavy liquid petrolatum and polyethylene glycol 400. A 3-10% concentration of Thixin gave a desirable ointment-like consistency. The gelling effect of the agent varied according to the type of material and the speed of mixing. Fifteen medicaments were incorporated with the six formulated bases and observed for changes after a storage period both at room and elevated temperatures. Ammoniated mercury and resorcinol gave the most discoloration. Peruvian balsam is incompatible with bases containing cottonseed and polyethylene glycol 400. All the ointment bases exhibited a degree of thixotropy but were restored to their original consistency upon standing. The ointment bases, except the polyethylene glycol 400 base, were not water-soluble, but it is possible to convert them by the incorporation of a surface-active agent before the addition of Thixon.

NORMAN HO

OINTMENT BASE, LARD CONTAINING

Re-Evaluation of Ointments Utilizing Lard as a Base, Silverman, H. and Urdang, A., J. Am. Pharm. Assoc., Pract. Ed. 19:430 (July) 1958.

Accelerated shelf life studies were carried out on a lard-containing ointment base. The formula used was: Pertes (a commercial, chemically-altered, refined lard) 65%, glycerylmonostearate s.e. 5%, Ucon fluid 50-HB-5100 20%, and Ethoxylan 100 (refined lanolin) 10%. This anhydrous base met the criteria of being smooth, homogeneous, stainless, odorless, tasteless, unctuous, and stable. In addition, the base was able to absorb as much as 40% water before losing its ointment-like consistency. Evidences of rancidity or other decomposition were absent. Although no apparent benefit could be gained from the addition of parabens to the base, it was recommended that the preservatives be added to prevent possible mold growth. The base showed a wide range of chemical compatibility with several commonly used topical medicaments incorporated in the base.

NORMAN HO

HISTORY OF FIRST RUSSIAN MILITARY HOSPITAL PHARMACY

250th Anniversary of the First Russian Military Hospital Pharmacy, Shavtsov, S. I., Aptechnoe Delo (U.S.S.R.) 7, 2:69 (March-April) 1958.

The first Russian military hospital was inaugurated in 1707 in the Lefortov part of Moscow by order of the Tsar Peter I. Its pharmacy, which consequently was the first military hospital pharmacy of Russia, differed fundamentally from other pharmacies of that historical period. The management of the hospital was carried out according to the "General Regulation of Hospitals" which contained a chapter "On the Duties of the Hospital Pharmacist." The preparation of medicaments in the pharmacy was executed using four sources: (1) cultivation of medicinal plants in the hospital's botanical gardens; (2) collection of wild medicinal plants; (3) obtain-

ing drugs from the Main Pharmacy of Moscow; and (4) purchasing of drugs. By the historical study of the nomenclature of medicaments compounded in the pharmacy it was ascertained that there were more than 300 drugs of animal, vegetable, and mineral origin used, among them e.g. castor, Spanish flies, camphor, almonds, mercury and its salts, preparations of copper, iron, zinc, lead, etc. The pharmacy, which consisted of two rooms (the dispensary and the laboratory), was situated in a wooden building; after the fire in 1737 it was moved into a stone-house. The most used equipment were balances, mortars, retorts, etc. Up to the time of the first edition of the Russian military pharmacopoeia in 1765, foreign pharmacopoeias and dispensatories, especially the Dispensatory of Brandenbury, were utilized.

At the beginning of the existence of the pharmacy, one of its main tasks was the pharmaceutical education of students of medicine. The teaching of pharmaceutical science (botany, pharmacognosy, pharmacy and pharmacology) was realized both theoretically (lectures) and practically (botanical excursions and practical activity in the pharmacy). Unfortunately, historical evidence was not found concerning the method of education of those aspiring to become members of the pharmaceutical profession, but in view of the fact that practical activity in a pharmacy was the only possibility for pharmacy candidates in that historical period, it seems probable that this military hospital pharmacy educated also future pharmacists.

Through the centuries the evolution went on. Today the hospital and its pharmacy are maintained by the personnel consisting of officers and soldiers of the Soviet Army.

HUBERT ZACEK

STEAM STERILIZATION OF DRESSINGS, INFLUENCE OF INITIAL VACUUM ON

Influence of Initial Vacuum on Steam Sterilization of Dressings, Knox, R. and Penikett, E. J. K., Brit. Med. J. 5072:680 (Mar. 22) 1958.

A high vacuum system was used to remove air rapidly from an autoclave chamber before admitting steam. The time taken to reach a minimum sterilizing temperature of 115° C. inside a standard drum was found to be about one minute when the pressure in the chamber, before admitting steam, was reduced to 20 mm. Hg (absolute) or below. When lesser degrees of vacuum were used the times taken for the temperature to reach 115° C. were variable and prolonged.

It is suggested that if rapid and predictable sterilization is required in an autoclave fitted with a pump for drawing a preliminary vacuum then the pump should be capable of rapidly reducing the pressure in the chamber to 20 mm. Hg (absolute) or below.

AUTHOR'S SUMMARY

OINTMENT, HYDROPHILIC

Hydrophilic Ointment, Stejskal, J., Ceskoslov. Farm. 7:237 (May)1958.

For the preparation of a hydrophilic ointment base and emulsifying wax the condensation products of ethylenoxide with castor oil and stearic acid can be used. An admixture of partial esters of glycerol with higher fatty acids adjusts suitably the hydrophilic-lipophilic balance of the emulsions. The conclusion contains the composition and preparation of an emulsion of hydrophilic ointment base and suggests the possibilities of using these bases for dermato-therapeutic prescriptions.

AUTHOR'S SUMMARY

OINTMENT BASES, POLYETHYLENE OXIDE TYPE

Contribution to the Evaluation of Ointment Bases of the Polyethylene Oxide Type Containing Eryfor A., Gruntova, Z. and Zathurecky, L., Ceskoslov. Farm. 7:230 (May) 1958.

After favorable experiences with ointments containing polyethylene oxide derivatives that were made abroad, the use of Eryfor A (a condensation product of oleic acid with 6 moles ethylene oxide produced by VCHZ Rybitvi) was investigated for the preparation of an emulsion ointment base of the water in oil type. After determining the basic constants of Eryfor A, the ointment bases were prepared containing 15% Eryfor A and admixtures of various emulsifiers and auxiliary substances adjusting the consistency. Out of these, two types of ointment bases were selected in which there were determined the constants, stability in the presence of stabilized solutions of various pH values, compatibility with current drugs used in dermatology and liberation of the effective compounds from the ointment into the medium followed by means of model experiments.

The advantages of the suggested ointment bases lie in that:

1. They are able to bind a considerably higher amount of water than the usual official ointment bases of the emulsion type.
2. The water-containing ointments prepared from these do not dry up and are not attacked by microorganisms and are therefore capable of long storage.
3. They liberate the incorporated drugs more easily than e.g. cholesterol salve Ph Bs II.

The authors recommend the two new ointment bases to be used in the preparation of dermatological salves under the condition that the production can guarantee to supply Eryfor A with a standard chemical composition and pharmaceutical quality.

AUTHOR'S SUMMARY

ETHYLENE OXIDE AND B-PROPIOLACTONE AS TISSUE STERILIZING AGENTS

Graft Sterilization—A Bacteriological and Histological Study of the Relative Merits of Ethylene Oxide and B-Propiolactone as Tissue Sterilizing Agents, with Special Reference to Arterial Grafts, Southerland, T. W., Williamson, G. M. and Zinnemann, K., Brit. Med. J. 5073:734 (Mar. 29) 1958.

A technique for the sterilization of tissue grafts with 1% B-propiolactone is described.

A comparative study shows that B-propiolactone is superior to ethylene oxide as a sterilizing agent for artery and bone grafts; it has greater sterilizing powers and is much easier and safer to use.

Freeze-drying, but not sterilization within either agent, leads to the appearance of small spaces with the intima and media of the arterial wall. We are of the opinion that the spaces are too small and sparse to cause any significant weakening of the arterial wall.

AUTHOR'S SUMMARY

CURRENT LITERATURE

. . . also calling your attention to the following articles appearing in recent hospital and pharmaceutical journals

. . . . . .

EDUCATION AND TRAINING

Sister Mary Junilla: Hospital Pharmacy, *Pacific Drug Review* 70:20 (June) 1958.

EQUIPMENT

Sykes, C.H.: Equipment and Apparatus—I. Filtration, *Public Pharmacist* (Great Britain) 15:163 (July) 1958.

HISTORY

Newman, F. H.: My 37 Years in Hospital Pharmacy, *Public Pharmacist* (Great Britain) 15:171 (July) 1958.

PARENTERAL SOLUTIONS

Tinker, R. B. and Hill, R. A.: Injection Techniques and Their Estimated Cost, *Hosp. Management* 86:116 (Aug.) 1958.

PHARMACOLOGY

Griefinger, William: Action and Reaction—A Profile of the New Drugs, *Hosp. Progress* 39:88 (July) 1958.

TEACHING

Blaug, Seymour M.: Teaching Prescription Writing to Medical Students, *Am. Profess. Pharm.* 24:548 (July) 1958.

GENERAL

Sister Mary Junilla: Hospital Pharmacy, *Pacific Drug Review* 70:24 (May) 1958.

Consulting WITH BOWLES

GROVER C. BOWLES JR., *Baptist Memorial Hospital, Memphis, Tennessee*

► How is inventory turnover computed and what is considered a satisfactory turnover rate for hospital pharmacy?

Merchandise or inventory turnover is computed by dividing the cost of goods sold during the fiscal period by the average of the opening and closing inventories. This gives the number of times the average inventory has been "turned" during the fiscal period. In hospital pharmacy the fiscal period is usually a year.

For example, if the cost of goods sold for the year were $200,000 and the average of the opening and closing inventories were $40,000, the turnover would be calculated:

$$\text{Turnover} = \frac{\text{cost of goods sold}}{\text{average inventory}} \text{ or } \frac{\$200{,}000}{\$40{,}000} = 5 \text{ turns}$$

Obviously this does not mean that every item in the inventory was sold or dispensed five times during the year. Some items may not have moved a single time, while other items may have been turned more than five times. In other words, the rate of turnover for Chloromycetin capsules, 250 mg. is much greater than for sulfadiazine tablets, 0.5 Gm. However, sulfadiazine is still a useful drug and cannot be eliminated from the inventory merely because its turnover rate is low.

A low turnover rate is usually considered to be a bad sign. Low turnover might be due to a variety of factors such as the purchase of slow moving items in large quantities or the lack of control of duplication of the same item under different trade names. An extremely high rate of turnover is also undesirable and usually indicates that fast moving items are being purchased in quantities too small to take advantage of maximum quantity discounts and bulk packaging. The maintenance and intelligent use of proper purchase records will assure a satisfactory turnover rate.

Generally a turnover rate of 4 to 6 is considered satisfactory for hospital pharmacy.

► How is the cost of goods sold computed?

The cost of goods sold is computed by adding the purchases during the fiscal year to the opening inventory and subtracting the closing inventory. The opening and closing inventories should be priced at cost. This method of arriving at the cost of goods sold is standard procedure in retail businesses. Admittingly, the cost of goods lost or stolen is included in the cost of goods sold. However, to segregate these losses, it would be necessary to keep additional records and it is doubtful if the increased accuracy would be worth the cost involved.

► Define depreciation and explain how depreciation works.

Depreciation is the loss in value of equipment which results from physical deterioration due to use or obsolescence. Since there is no accurate method of predicting the service life of fixed equipment, it must be estimated. Generally, the cost of the item is divided by the estimated service life in years. This amount is then charged as depreciation expense against the department and credited to the hospital equipment account. Although the principal is the same, the actual accounting procedures used will vary from hospital to hospital.

Here are some typical examples of how equipment in the pharmacy is depreciated for accounting purposes:

Typewriter	5 years
Prescription Balance	10 years
Metal Cabinets	25 years
Electric Mixer	10 years
Narcotic Safe	25 years

► Please recommend an efficient non-toxic denaturant for ethyl alcohol.

The primary purpose for denaturing alcohol is to make it unfit for beverage purposes. At the same time, it is desirable to use a denaturant which when ingested will not produce permanent damage. For this reason, substances such as methanol are not recommended for denaturing alcohol for hospital use.

Sucrose octa-acetate is an ideal substance for denaturing alcohol for general hospital use. It has a low order of toxicity and an intensely bitter taste, readily detectable in dilutions of 1:200,000.

Sucrose octa-acetate is used commercially as a denaturant in rubbing alcohol. Alcohol Rubbing Compound, N.F., contains not less than 355 mg. of sucrose octa-acetate in each 100 ml. Sucrose octa-acetate in a concentration of 0.15 percent is sufficient to discourage the use of hospital alcohol for drinking purposes.

The sucrose octa-acetate is added to the undiluted alcohol. When it is completely dissolved, sufficient water is added to produce the dilution of alcohol desired. Dyes such as methylene blue, gentian violet, or fluorescein may be added to color alcohol. Generally, sufficient color is added to tint gauze squares but not enough to stain uniforms and bed linens.

Sucrose octa-acetate is available from the Carbide and Carbon Chemicals Company, a division of Union Carbide and Carbon Corporation, 30 East 42nd Street, New York 17, New York.

DRUG EVALUATIONS

by the Council on Drugs of the American Medical Association

► THE FOLLOWING MONOGRAPHS and supplemental statements on drugs have been authorized by the Council on Drugs of the American Medical Association for publication and inclusion in *New and Nonofficial Drugs*. They are based upon the evaluation of available scientific data and reports of investigations. In order to make the material even more valuable, dosage forms and preparations of individual drugs have been added to the monographs. These dosage forms and preparations were not taken from material published in the *Journal of the American Medical Association* by the Council on Drugs; rather, they were obtained from such manufacturers' brochures, news releases, etc., which were available to us at the time of publication. An attempt has been made to make the list of dosage forms as complete as possible. However, no guarantee can be made that the list of preparations is complete and it is suggested that hospital pharmacists consult manufacturers' releases for additional dosage forms and preparations.

The issues of the *Journal of the American Medical Association* from which each monograph has been taken is noted under each monograph. Monographs in this issue of the JOURNAL include those published in the *Journal* to July 5, 1958.

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TO DRUGS EVALUATED IN THIS ISSUE

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TO EVALUATED DRUGS IN THE JANUARY THROUGH AUGUST 1958 ISSUES OF THE AMERICAN JOURNAL OF HOSPITAL PHARMACY.

Infantile Diarrhea — Current Status of Therapy in

Report to the Council

The Council has authorized publication of the following report. Nonproprietary terminology is used for all drugs that are mentioned; when such terminology is not considered to be generally well known, its initial appearance is supplemented by parenthetic insertion of names known to be applied to commercial preparations.

H. D. KAUTZ, M.D., *Secretary*

Current Status of Therapy in Infantile Diarrhea

ROBERT E. COOKE, M.D., BALTIMORE

This paper is a brief review of the therapeutic problems of diarrhea in infancy, especially acute diarrhea. Practical aspects of treatment are presented rather than theoretical principles. Other sources should be consulted for information on basic problems such as bacterial resistance, pharmacology of antibiotics, water and electrolyte physiology, and gastrointestinal allergy.

The incidence of diarrhea in infancy and childhood remains relatively high, although modern therapy has markedly lowered mortality. Each year several hundred cases of diarrhea are treated at the Harriet Lane Home in Baltimore. Even in areas of high socioeconomic status, severe epidemics of diarrhea continue to occur in nurseries for newborn infants. The epidemiology and prevention of such outbreaks will be discussed, since specific antibacterial therapy represents a significant part of recommended prophylactic measures.

From the Department of Pediatrics, Johns Hopkins University School of Medicine, Johns Hopkins Hospital.

Diagnosis

Diarrhea may be defined as an increase in the volume of stools. However, the diagnosis of diarrheal disease cannot be made precisely, particularly in young infants, since considerable variation in the number and size of stools normally exists. Clinical criteria of illness such as apathy, change in appetite, cessation of weight gain, and signs of water loss must be evaluated in addition to the observation of bowel movements. Optimum therapy of diarrhea requires an etiological diagnosis, and the following outline presents such a classification of etiological factors. The term "acute diarrhea" applies to a solitary, abrupt episode of only a few days' duration.

Etiological Classification of Diarrhea in Infants

Acute

Improper Feeding
- Overfeeding

Mechanical
- Shunt
- Partial obstruction

Chemical
- Accidental ingestion of heavy meals, boric acid, exotoxin

Biochemical
- Hypoadrenalism

Infectious, parenteral
- Viral
- Bacterial
- Fungal

Infectious, enteral
- Viral
- Bacterial
- Fungal
- Protozoan

Chronic or Recurrent Acute

Improper Feeding
- Overfeeding

Mechanical
- Shunt
- Partial obstruction

Chemical
- Accidental ingestion of heavy metals, boric acid, exotoxin

Biochemical
- Gastrointestinal alkalosis
- Celiac disease
- Cystic fibrosis of the pancreas

Neoplastic, parenteral
- Ganglioneuroma

Neoplastic, enteral
- Lymphoma
- Polyposis

Allergic, enteral
- Milk

Allergic, parenteral

Psychogenic

Infectious, enteral
- Viral
- Bacterial
- Fungal
- Protozoan
- Parasitic

Idiopathic
- Regional ileitis
- Ulcerative colitis

Improper feeding is now less commonly considered as a cause of significant diarrhea than it was several years ago. Overfeeding, particularly, seems to have diminished in frequency, as a more reasonable and restricted demand-routine is followed. Mechanical factors, especially partial intestinal obstruction, may predispose the infant to severe acute diarrhea. Inflammatory changes in the intestinal wall proximal to the site of obstruction lead to extreme hyperperistalsis, particularly if a pathogenic micro-organism is present. Severe enteritis represents one of the major complications in the management of megacolon (Hirschsprung's disease), and this diagnosis must be considered in infants with persistent diarrhea, even in the absence of constipation. Acute diarrhea in infants may be caused by the accidental ingestion of preformed toxic substances such as boric acid, excessive iron, or staphylococcic exotoxin. The latter problems are discussed in connection with the treatment of enteric infection.

Increase in the volume of stools may be associated in infants with infection in organs other than those of the gastrointestinal tract. Control of pneumococcic and streptococcic pharyngitis, otitis media, and cervical adenitis by penicillin therapy has reduced the incidence of this type of diarrhea significantly. On the other hand, enteric infections continue to occur with relatively high frequency. Micro-organisms of many varieties have been reported to produce acute infectious diarrhea in infants. Several viruses have been isolated from outbreaks in hospital nurseries. Recently, enteric cytopathogenic human orphan (ECHO) viruses have been incriminated. The preventive and therapeutic approach to such infections is similar to that for enteric bacterial infection, except for antibiotic therapy.

The bacteria which are considered enteric pathogens in infants are listed in table 1. Salmonella organisms have been demonstrated to contaminate nurseries for prolonged periods of time. Shigellosis, on the other hand, is generally a problem of older infants and children in whom finger-to-mouth and fly-to-food transmission plays a more important epidemiologic role. Pseudomonas organisms may be found in the stools of asymptomatic infants; however, they are considered a possible cause of diarrhea by most workers. Acute staphylococcic enteritis, complicating broad-spectrum antibiotic therapy, is observed less frequently in infants and children than in adults. The sudden onset of extreme hyperpyrexia and hypotension, which is refractory to blood or plasma transfusions and only partly responsive to hydrocortisone (Cortef, Cortril, Hycortole, Hydrocortone), given intravenously, and to levarterenol (Levophed) bitartrate, is characteristic. Hemolytic streptococci, group D, have been thought to produce diarrhea in infants through the conversion of tyrosine to tyramine. Neonates are allegedly susceptible because of a deficiency of tyramine oxides. However, this theory lacks solid substantiation.

TABLE 1.—*Bacteria Producing Acute Infantile Diarrhea*

Group	Organism
Salmonella	choleraesuis, oraienburg, typhimurium
Shigella	sonnei, flexneri
Escherichia coli	subtypes O 11 B 4, O 55 B 5
Pseudomonas aeruginosa (?)	---
Staphylococcus aureus	---
Hemolytic streptococci	group D(?)

At present, pathogenic strains of Escherichia coli constitute the major problem in infectious diarrhea in infants. At least 20 serologically distinct types have been demonstrated to be responsible for nursery epidemics throughout the world. Early and rapid identification of these organisms is essential, so that specific therapy and prophylaxis may be instituted and spread prevented. The stool rather than a swab of the rectum should be cultured, since these organisms undergo intraluminal rather than intramural multiplication. MacConkey's eosin-methylene blue and blood agar plates are used. Colonies are typed by slide or tube agglutination or precipitin techniques before and after heating. Rapid and accurate identification of pathogenic E. coli is now possible through the use of fluorescein-labeled rabbit antiserum applied directly to smears of feces. Comparison of this technique with accepted methods of culture indicates that smears so stained may demonstrate live organisms that do not grow on mediums because of inhibition by antibiotics.

TABLE 2.—*Antimicrobial Therapy of Diarrhea*

Organism	Drug	Oral Daily Dose, Mg./Kg. of Body Weight 100
Salmonella	Chloramphenicol plus Tetracycline	40
Shigella	Polymyxin B sulfate or Chloramphenicol or Tetracycline	10-20 100 40
Pseudomonas	Neomycin sulfate plus Polymyxin B sulfate	100 10-20
Escherichia coli, group B	Neomycin sulfate plus Polymyxin B sulfate	100 10-20
Staphylococcus aureus	Erythromycin (Ilotycin) plus Chloramphenicol plus Neomycin sulfate	40 100 100
Hemolytic streptococci, group D	Neomycin sulfate or Polymyxin B sulfate	100 10-20

Therapy

The treatment of acute infantile diarrhea may be considered from three standpoints, antimicrobial therapy, fluid therapy, and dietary therapy.

Antimicrobial Therapy.—Since antimicrobial therapy depends upon a specific etiological diagnosis, every effort should be made to isolate a pathogenic micro-organism.

Amebiasis has been reported in infants even in urban areas in the United States. Acute severe diarrhea, intermittent fever, or a chronic celiac-like syndrome may be the clinical manifestation of infection. Review of the literature, rather than personal experience, indicates that several agents are effective. Fumagillin (Fumidil), 1 mg. per kilogram of body weight per day for 10 days, or diiodohydroxyquin (Diodoquin, Yodoxin), 120 mg. per kilogram of body weight per day for 20 days, may be given by mouth. Bacitracin plus iodine 12.5% in the form of tablets has been recommended in a dosage of 10,000 units per day for 14 days for infants weighing less than 7 kg. and 20,000 units for infants weighing 7 to 12 kg.

Candida (Monilia) albicans likewise is an unusual cause of diarrhea in infants, except as a rare complication of antibiotic therapy. Nystatin (Mycostatin), 100,000 units four times a day for seven days, should be given in addition to stopping administration of other antibiotics. If broad-spectrum antibiotics must be continued for other disease, a combination of tetracycline plus nystatin (Mysteclin) may be used. Amphotericin B (Fungizone) may be even more effective against fungi than is nystatin.

The chemotherapeutic agents which are recommended for specific bacterial infections are listed in table 2. Test-tube tests or disk-sensitivity tests should be used whenever

possible to permit optimal antibiotic therapy. The treatment of Salmonella infection is relatively unsatisfactory. Usually symptoms are controlled by chloramphenicol (Chloromycetin) alone or chloramphenicol plus tetracycline. The combination is probably preferable. Positive stool cultures and, occasionally, blood cultures may persist for weeks.

By contrast, Shigella infection responds to a number of drugs. Symptoms of diarrhea and fever usually last only a few days, even in untreated patients. The carrier state may persist longer, and spread of organisms may be greater if no chemotherapy is given. Although sulfonamides have been used extensively, bacterial resistance develops rapidly in epidemics. A similar phenomenon occurs when streptomycin, given orally, is used. Chloramphenicol or tetracycline (Achromycin, Panmycin, Polycycline, Tetracyn, Tetracyn V), whether given parenterally or orally, leads to rapid clinical improvement and negative stool cultures, at least temporarily. Polymyxin B (Aerosporin) sulfate given by mouth in a dose of 10 to 20 mg. per kilogram of body weight per day for 10 days would seem to be the most effective agent, as far as eradication of organisms from the stools is concerned.

Of particular interest from the standpoint of nursery epidemics is the antimicrobial therapy of diarrhea caused by pathogenic E. coli. Neomycin (Mycifradin) sulfate given by mouth in a dose of 100 mg. per kilogram of body weight per day for 14 days produces rapid clinical improvement in the patient and prompt reduction, but not eradication, of the pathogenic organisms in the stools. Although not yet tested extensively in clinical trials, the combination of neomycin and polymyxin B sulfates in vitro is more effective than either alone and is recommended as the most effective therapy currently available.

Fluid Therapy.—Diarrhea, regardless of etiology, leads to losses of water, sodium, and potassium. The replacement of these deficits and the administration of water and electrolytes to meet continuing normal and abnormal losses must be guided by clinical means. Physical signs of dehydration are more helpful than laboratory procedures in assessing deficiencies in volume of body fluids (dehydration). Determination of the serum concentration, carbon dioxide content, and nonprotein nitrogen (or blood urea nitrogen) level is particularly helpful in individualizing certain phases of treatment. Table 3 shows the approximate deficits that may be expected in moderately severe dehydration due to diarrhea, although considerable variation exists from one patient to another.

Of particular interest and importance are the findings in hypertonic dehydration. This disturbance is now seen commonly because of the frequent use of improperly made electrolyte mixtures or of concentrated milk mixtures of high renal solute load even in hot weather. The deficits of sodium and potassium are small, and usually there is an excess (negative deficit) of chloride within the body. Suggested programs for replacement of deficits of water and electrolytes are given in table 4.

Initially, extracellular volume is expanded rapidly by a relatively small amount of slightly hypotonic fluid (lactated Ringer's injection) in order to improve circulation and renal function. Blood is used to correct shock and severe anemia. It should not be administered until some expansion of extracellular volume has been effected. Intracellular deficiencies of water and electrolytes and remaining deficiencies of the extracellular space are replaced more slowly. In hypertonic dehydration (sodium >160 mEq. per liter), therapy must be administered cautiously. Rapid reduction in sodium concentration with excess water probably leads to cerebral edema. Although deficits of potassium are relatively small, this cation should be given, since the development of hypocalcemic tetany can thereby be prevented. Severe seizures, which frequently occur 24 to 48 hours after beginning therapy may respond to small amounts of hypertonic saline solution (3 cc. of a 3% saline solution per kilogram of body weight given in one to two hours) if the usual anticonvulsants such as phenobarbital are ineffective. Congestive heart failure occurs occasionally with hypernatremia and requires careful but rapid digitalization.

TABLE 3.—*Deficits of Water and Electrolytes in Infants with Moderately Severe Dehydration Due to Diarrhea**

Dehydration, Kind	Water, Ml.	Sodium mEq.	Potassium, mEq.	Chloride, mEq.
Isotonic	100-120	8-10	8-10	8-10
Hypertonic	100-120	2-4	0-4	—2- —6
Hypotonic	100-120	10-12	8-10	10-12

*Figures given per kilogram of body weight.

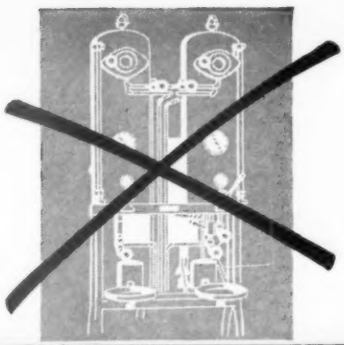
TABLE 4.—*Deficit Therapy of Infants with Moderately Severe Dehydration and Electrolyte Disturbance**

Dehydration, Kind	Solution	Ml./Kg. of Body Weight	Time Schedule from Onset of Therapy, Hr.	Route
Isotonic	Lactated Ringer s injection	20	0-1	Intravenous
	Blood†	10	1-2	Intravenous
	5 or 10% invert sugar (dextrose and fructose) or dextrose in water	40	2-8	Intravenous
	Lactated potassic saline injection	60		
Hypotonic	Lactated Ringer's injection	20	0-1	Intravenous
	Blood	10	1-2	Intravenous
	5% invert sugar or dextrose in lactated Ringer's injection	40	2-8	Intravenous
	Lactated potassic saline injection	60		
Hypertonic	Lactated Ringer's injection	20	0-1	Intravenous
	Blood	10	1-2	Intravenous
	5 or 10% invert sugar or dextrose in water	60	2-8	Intravenous
	6th molar sodium lactate injection	20		
	Potassium acetate	0.5		
	Calcium gluconate injection‡			

*To be followed by usual maintenance fluid therapy plus replacement of abnormal losses.
†Not considered part of deficit therapy; for shock or anemia.
‡To be used for signs of tetany.

Deficit therapy is followed by the administration of adequate fluid to meet the usual losses of water and electrolytes from the body as well as abnormal fecal losses. Stool losses range from 50 to 300 cc. per day in young infants, depending upon the severity of the diarrhea. Stool losses are best replaced by lactated potassic saline injection (Darrow's solution) diluted with an equal part of 5% dextrose in water. Menadione, 1 mg. per day, or other vitamin K derivative should be administered parenterally to combat hyperprothrombinemia, which is observed occasionally in severe diarrhea.

Dietary Therapy.—Oral feedings may be administered after cessation of profuse diarrhea, vomiting, and abdominal distention. A dilute water and electrolyte mixture (Harriet Lane Home mixture) should be given initially in amounts varying from 100 to 150 cc. per kilogram of body weight per day. This mixture contains the following ingredients: sodium chloride, 1.7 Gm.; potassium bicarbonate, 2.0 Gm.; and sucrose, 50 Gm. This mixture (1 unit) is added to one quart of water, or one quart of water is used, to which is added a powdered preparation of electrolytes (Lytren), given orally, so as to provide the following per liter of solution: sodium, 50 mEq.; potassium, 20 mEq.; calcium, 4 mEq.; magnesium, 4 mEq.; citrate, 35 mEq.; sulfate, 4 mEq.; chloride, 30 mEq.; phosphate, 10 mEq.; and lactate, 4 mEq.



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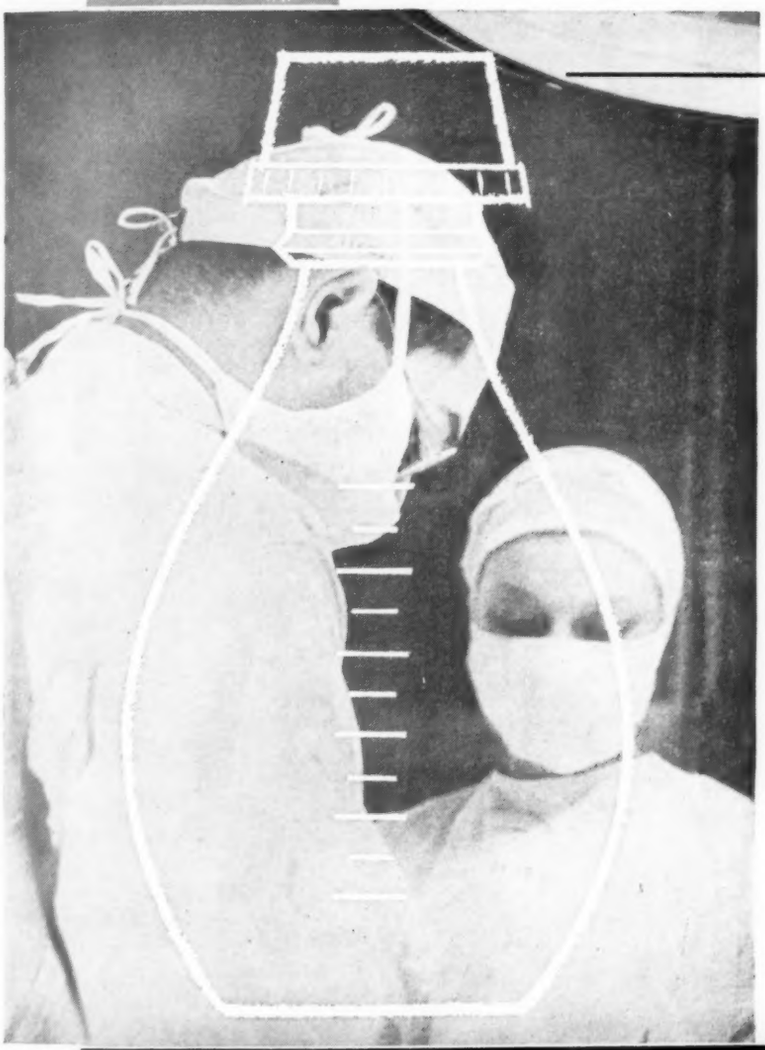

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In mild cases not requiring hospitalization, such mixtures may be used for replacement of small deficiences of body fluids. Such therapy is more rational than the time-honored regimen of boiled skimmed milk. The latter fluid presents a high renal solute load at a time when extrarenal losses of water are high. Two dangers in the use of electrolyte mixtures are encountered. First, parents may use more than the recommended amounts of powder in home preparation, and hyperosmolarity (hypernatremia) may result. This difficulty may be obviated by using unit packaging such as the Harriet Lane Home unit. Second, more than 150 to 200 cc. per kilogram per day may be ingested, resulting in continuing diarrhea. Substitution of parenterally administered fluids for oral intake leads to prompt cessation of diarrhea in such patients.

Milk mixtures or milk substitutes are given in gradual increments in place of orally administered water and electrolyte mixtures as the volume of stools decreases. Since there is evidence that gastrointestinal permeability to whole protein is increased in the recovery phase of diarrhea, hypoallergenic mixtures such as hydrolyzed casein or soybean formulas are recommended. Although full caloric intake throughout the diarrheal disorder has been recommended by some authors, such a practice leads to increased stool losses of water and electrolytes and thereby prolongs and complicates parenteral fluid therapy. The use of nonspecific measures such as absorbing agents or demulcents is not indicated in diarrhea in infants. Diiodohydroxyquin, which has been shown to be effective in mild chronic or relapsing diarrhea of unknown etiology, cannot yet be considered suitable for use in acute infantile diarrhea.

Preventive Measures

The physician is responsible not only for the care of the infant with diarrhea but also for the prevention of spread of the disease. Complete eradication of pathogenic organisms is not yet possible, but the chances for spread of infection are minimized by quantitative reduction in the number of pathogens in the environment. Careful handwashing techinque and terminal sterilization have significantly reduced milk-borne infection. By contrast, air-borne infection is difficult to eradicate, particularly in the case of pathogenic E. coli, since prodigious numbers of these organisms may be excreted. Bacteriological study of air samples indicates that procedures such as changing diapers, making up bassinets, and weighing the infant lead to gross contamination of the environment if an infant is infected. In the presence of crowding, inadequate turnover of nursery air, and inexperienced personnel, spread of infection is inevitable.

Control of the number of pathogenic bacteria in the environment may be effected by administration of proper antibiotics. Neomycin and polymyxin B sulfates in the dosage recommended for therapy should be given to all infants in the nursery when pathogenic E. coli are recovered from patients with diarrhea. Such therapy not only protects the other infants but also prevents gross contamination of the physical facilities.

Chemotherapy cannot be used as a substitute for all other control measures, and nurseries must be closed when two or more cases of diarrhea are detected. All personnel should be tested and relieved from duty if they are carriers. Isolation techniques must be made more stringent and cross contamination reduced by minimizing movements of contaminated articles.

J.Am.Med.Assoc. 167:1243 (July 5) 1958.

From Canada

I have just returned from Los Angeles, where I had the pleasure of attending the Annual Meeting of the AMERICAN SOCIETY OF HOSPITAL PHARMACISTS, and the American Pharmaceutical Association Convention. It was a very full and enjoyable week, and while I could fill many pages with my observations, I must be brief and confine my comments to those items and incidents which left the greatest impression.

—The hospitable welcome extended the small group of Canadians, and the way we were made to feel "at home" in their meetings.

—The business-like methods of handling reports and resolutions, the material being so well prepared and supplemented by written reports, that lengthy discussion of subject background would have been superfluous.

—The large attendance at the pre-convention seminar on education and training, hardly an event one would expect to draw a large crowd on a Saturday night in a city renowned for its entertainment facilities.

—The good representation of Government pharmacists, including Public Health Service and Veterans Affairs.

—The report that the *American Formulary Service* would be ready this summer. Dr. Heller and his committee have worked hard to achieve near-perfection in this worthy, but ever-changing, project, and I am sure that many Canadian hospitals will wish to avail themselves of the service.

—And lastly, the proposal that consideration be given to by-law changes which would award a "Fellowship" classification of membership to those earning the recognition by qualifying under rigid standards of examination and experience. *From*: "President's (J. E. Smith) Point of View"—*Hosp. Pharm.* (Canada) 11:143 (May-June) 1958.

POSITIONS

in hospital pharmacy

The Personnel Placement Service is operated without charge for the benefit of hospitals and pharmacist members of the American Pharmaceutical Association and the AMERICAN SOCIETY OF HOSPITAL PHARMACISTS. The ultimate purpose is the improvement of pharmaceutical services in hospitals, by more adequately fulfilling hospital pharmacy personnel needs and by locating positions which provide challenging opportunities for pharmacists who have indicated an interest in a hospital career.

By participating in the service, the hospital indicates a desire to achieve a pharmaceutical service which meets the Minimum Standard for Pharmacies in Hospitals. A description of the position should be submitted to the Division of Hospital Pharmacy on the forms provided. The hospital will receive applications directly from the applicant. The hospital agrees to reply to each application received and to notify the Division of Hospital Pharmacy when the position is filled.

The pharmacist, by participating, agrees to submit a Personnel Placement Service Information Form to the Division of Hospital Pharmacy. The applicant will then be notified of openings listed with the Service as they become available and can negotiate directly with the hospital if he is interested. It is agreed that the Division of Hospital Pharmacy will be notified as soon as a position is accepted.

A listing of positions open and wanted will be made regularly in the AMERICAN JOURNAL OF HOSPITAL PHARMACY without charge. Neither the name of the hospital offering the position nor the name of the applicant will be listed, except by code. All inquiries should be directed as shown below, including the code number.

Address all inquiries to
Division of Hospital Pharmacy
2215 Constitution Avenue, N. W.
Washington 7, D.C.

positions wanted

PHARMACIST—Female; experience in both hospital pharmacy and retail pharmacy. Prefer southwest or mid-Atlantic area. PW-11

CHIEF PHARMACIST—Prefer general hospital in Fla. registered in Ohio and Fla.; experience in both hospital and retail pharmacy work. PW-12

CHIEF PHARMACIST—(or Asst. Pharmacist at large hospital); prefer vicinity of St. Louis; now employed as staff pharmacist at hospital; registered in Mo. PW-13

CHIEF PHARMACIST—Prefers Minn. or Calif. registered in both states. 10 years' experience government service, including commissions in U.S. Public Health Service and Navy; experience with VA as Chief Pharmacist; Ph. D. in pharmacy. PW-15

PHARMACIST—N. J. registration; prefers Pa., Fla., D.C., or Va., experience in managing retail pharmacy. PW-18

CHIEF PHARMACIST OR CHIEF PHARMACIST PURCHASING AGENT— Prefers nonsectarian and nongovernmental institution of up to 200-bed capacity or larger. Now employed. Experienced retail and hospital pharmacy. PW-19

CHIEF PHARMACIST IN A TEACHING HOSPITAL—Registered Ind., Mich., and Mo.; prefers general hospital in Midwest; experience in teaching and in hospital pharmacy. PW-26

PHARMACIST—Registered in Ohio since 1934; experience in retail pharmacy only (23 years) PW-27.

PHARMACIST—Prefers vicinity of Chicago; registered in Ill., now employed there. Graduate of Univ. of Ill. College of Phar. PW-31.

CHIEF PHARMACIST OR ASST. PHARMACIST—Prefers medium size hospital; registered in Ind., Mich., and Wis. 8 years' experience chief pharmacist and purchasing agent. Prefers Midwest or East. PW-32.

STAFF PHARMACIST—B.S. Mass. College of Pharmacy; age 27; registered in Mass. and N.H. 8 years' retail experience. PW-35.

CHIEF PHARMACIST OR ASST. CHIEF PHARMACIST—B.S. Pharm. M.S. in Hospital Pharm. Male; Prefers East or Midwest. PW-36.

PHARMACIST (LARGE TEACHING HOSPITAL) OR ADMINISTRATOR— Registered in Ohio; experience in retail pharmacy, hospital administration and X-Ray. PW-37.

CHIEF PHARMACIST—Male, married; B.S., working on M.S. 4 years' experience hospital pharmacy. Registered Pa. PW-42.

PHARMACIST—Male, married; B.S. four years retail experience Army Dispensary. Registered N. Y. desires to locate in East. PW-44.

PHARMACIST—Graduate of Medical College of Va.; age 26; two years Marine Corps. Managerial experience. PW-45.

HOSPITAL PHARMACY INTERN—Graduate of Univ. of Wash. has completed military service. Prefers northwest. PW-46.

STAFF PHARMACIST—Graduate Howard Univ. College of Pharmacy; limited experience; anxious to learn. Any location. PW-50.

STAFF PHARMACIST—Graduate George Washington College of Pharmacy; extensive retail pharmacy experience. Prefers. D.C. or Fla. PW-52.

CHIEF PHARMACIST—Prefers middle West; registered in Ill., female, single; graduate of Univ. of Ill. College of Pharmacy; now employed as Chief Pharmacist. PW-61.

CHIEF PHARMACIST—M.S. degree in hospital pharmacy; prefers East; male, single; extensive experience, including pharmacy and administrative officer in Air Force. PW-62.

STAFF PHARMACIST—Completed military requirements; experienced in hospital pharmacy; prefers mid-Atlantic area, single. PW-63.

CHIEF PHARMACIST—Registered in Tenn., La., Tex.; prefers South; graduate Univ. of Tenn., School of Pharmacy. PW-64.

PHARMACIST—Desires position Baltimore area; prefers small hospital; experience includes 21 years as owner-manager of retail store. PW-65.

INDIAN PHARMACIST—Desires appointment to obtain higher training in hospital pharmacy; graduate Madras Univ.; 1½ years' experience in 1,000 bed hospital, including inpatient and outpatient dispensing, parenteral and general manufacturing and administration. Available September, 1958. PW-68.

CHIEF PHARMACIST—M.S. degree in hospital pharmacy; served residency at VA Center in Los Angeles; 3 years' experience as chief pharmacist in VA since that time. Registered in Ky. and Fla.; prefers Midwest. PW-69.

CHIEF PHARMACIST—Male, married; B.S., Ph. G., now employed chief pharmacist. Prefers South or Southwest. Registered Ala. and Va. Desires administrative work along with pharmaceutical. PW-70.

CHIEF PHARMACIST—Male, married. B.S. 3 years' hospital experience; Registered N. Y. and Vt.; desires to locate in N. Y. or adjoining state. PW-71.

STAFF PHARMACIST—Female, married; internship at Freedman's Hospital; experience in hospital pharmacy. B.S. prefers D.C. area. Registered in Ind., D.C. and N. C. PW-72.

CHIEF PHARMACIST—Female, single; hospital experience. Desires position 100 bed hospital. B.S. Registered Ky. Prefers Ky. PW-73.

HAITIAN STAFF PHARMACIST—Male, married. Has 5 years' hospital experience. Present owner of pharmacy. Desires to locate in northwest U.S. PW-74.

ASST. CHIEF PHARMACIST—Male, married. Registered in Calif. and Wash. Background of drug company representative, retail pharmacy and now employed in Clinic and Research Foundation as Chief Pharmacist. Prefers Pacific states or Ariz. Location. PW-76.

CHIEF PHARMACIST—Male, single, B.S. and M. S. in Hospital Pharmacy. Serving hospital pharmacy internship. Prefers Midwest or East. PW-77.

CHIEF PHARMACIST—Male, married, registered N.Y. and Pa. Extensive hospital pharmacy experience. Now employed as assistant director of pharmacy. Prefers eastern part of country. PW-78.

ASST. PHARMACIST—Male, married. Registered Minn. 10 years' hospital experience. Desires midwest location. PW-79.

CHIEF PHARMACIST—Male, married, registered Mass., Conn., and Calif. 6 years' retail and 4 years' hospital experience. M.S. hospital pharmacy. Desires northeast location. PW-81.

PHARMACIST—Self-employed retail pharmacy for 20 years. Ph. G. degree; registered N. Y. 3 years' hospital experience. Prefer locate N. Y. PW-84.

ASST. CHIEF PHARMACIST—Male, married. Registered Iowa. 3 years' USAF hospital experience. Served hospital pharmacy internship. Candidate M.S. August 1958. Prefers Iowa and West. PW-85.

CHIEF PHARMACIST—16 years' hospital pharmacy, now employed Chief pharmacist. Female, single. Registered Mich. and Ill. Prefers locate Midwest. PW-85-A.

STAFF PHARMACIST—4 years' hospital pharmacy experience; prefers Wash. state (registered). Female, married. B.S. pharmacy. PW-87.

IRANIAN PHARMACIST—Desires opportunity to continue hospital pharmacy studies; single, age 30; excellent academic background; now studying industrial chemistry. Prefers location in West or Northeast. PW-88.

ASST. CHIEF PHARMACIST—Female, single; B.S. 1 year hospital pharmacy internship; registered Okla. Prefers West or Southwest. PW-89.

ASST. PHARMACIST—Female, married. Educated and trained in Philippines. Served hospital internship. Registered Manila. Desires to locate East Coast of U.S. PW-91.

CHIEF PHARMACIST—Prefers large hospital. Male, married; registered N.H., Mass., Calif. 10 years' VA hospital experience. PW-92.

CHIEF PHARMACIST—Prefers small hospital in Ohio. Male, married; B.S.; registered Ohio. Excellent academic and professional background. PW-93.

PHARMACIST—Male, single. Finished internship Freedmen's hospital June, 1958. PW-94.

STAFF PHARMACIST OR ASST. CHIEF—Female, single. Filipino, educated and trained Philippines. 10 years' hospital experience. Served hospital pharmacy internship. PW-95.

STAFF PHARMACIST—Male, single. Registered Del. Desires Mid-Atlantic area. Completed hospital pharmacy internship. PW-96.

STAFF PHARMACIST—23 years' retail pharmacy experience, 7 years' hospital experience. Female, registered in and prefers Va. PW-97.

STAFF PHARMACIST—Completed internship July, 1958. Registered D.C. Male, desires to locate in East or Midwest. PW-98.

STAFF PHARMACIST—Several years of both retail and hospital pharmacy experience. Male, married. Registered Ohio and Ky. Desires to locate in either state. PW-99.

ASST. PHARMACIST—Male, married. Registered Tenn. and La. Retail pharmacy experience only. Desires to locate in South. PW-100.

STAFF PHARMACIST—Male, married B.S. registered D.C. Desires to locate Midwest or West. 2 years' as instructor in pharmacy plus retail and laboratory experience. PW-101.

PHARMACIST—Male, married. Registered Ill. Desires to locate in New England. PW-102.

CHIEF PHARMACIST—Male, married. Registered N.J., and Pa. Retail and hospital pharmacy experience. PW-103.

STAFF PHARMACIST—Single female, registered Mo. B.S.; hospital pharmacy experience. Desires locate Midwest. PW-104.

PHARMACIST—Male, married, 20 years' experience retail pharmacy. Registered Pa., desires to locate in Philadelphia. PW-105.

CHIEF PHARMACIST—Male, married. 3 years' hospital experience, plus retail. Registered Wis., desires locate Seattle area. B.S. pharmacy and chemistry. PW-106.

PHARMACIST—Filipino, female. B.S. pharmacy, Univ. of Philippines. Desires locate Washington, D.C. PW-107.

STAFF PHARMACIST—Single, female, citizen of and registered Philippines. B.S., M.S. and hospital pharmacy internship in U.S. PW-108.

positions open

STAFF PHARMACIST—For manufacturing or dispensing in large teaching hospital; Ill. registration; excellent equipment; good hours; two weeks' vacation; sick leave; min. starting salary $470. PO-1.

CHIEF PHARMACIST—350 bed hospital. Must be eligible for licensure in N.J.; interest in manufacturing; 44 hour week, 2 weeks' vacation. salary $5200-$5700. PO-6.

PHARMACIST—80 bed hospital. Full responsibility for pharmacy and Central Sterile Supply Services; min. one year's experience in hospital pharmacy; salary open. PO-17.

ASST. CHIEF PHARMACIST—209 bed general hospital—expanding to 300 beds. 40-hour week; 3 weeks' vacation. $5,000 salary. N.J. registration required. PO-18.

PHARMACIST—162 bed hospital located in Ohio. Assume complete charge of department. Prefer woman with hospital pharmacy internship. Salary open. PO-21.

ASST. CHIEF PHARMACIST—185 bed hospital. Prefer member of Seventh Day Adventist Church. PO-22.

"ROTATING" PHARMACIST—To serve several small hospitals. Registration in both Va. and Ky. required. Excellent personnel policies. Salary $7,080 plus travel and living reimbursement while away from base hospital. Also CHIEF PHARMACIST and STAFF PHARMACIST positions available at $6420 and $5880 respectively. PO-26.

STAFF PHARMACIST—274 bed general hospital and 172 bed maternity hospital. Calif. registration required; female preferred. Salary, $525 per month; benefit program represents 17 percent base salary. PO-27.

CHIEF PHARMACIST—169 bed general hospital. S. C. registration required. Starting salary $400 with excellent opportunities for advancement. PO-28.

ASST. CHIEF PHARMACIST—315 bed community hospital located in N.Y. state. Female preferred; 40 hour week; 3 weeks' vacation. Salary open. PO-31.

ASST. CHIEF PHARMACIST—181 bed general hospital. Calif. registration required. 40 hour week; 2 weeks' vacation. Salary $450 to $500. PO-32.

STAFF PHARMACIST—550 bed general hospital located in Ohio. 40 hour week; 2 weeks' vacation. Salary $400-$450. PO-34.

STAFF PHARMACIST—259 bed general hospital. Va. registration required. Hospital pharmacy experience preferred. 40 hour week, 2 week's vacation. Salary open. PO-35.

STAFF PHARMACIST—750 bed general hospital located in N.Y. state. B.S. required. Hospital pharmacy experience desirable, but not necessary. 40 hour week, 2 weeks' vacation. Salary $415. PO-36.

STAFF PHARMACIST—216 bed general hospital. Duties include manufacturing, dispensing, inventory control and some supervision. 3 pharmacists in dept. Tenn. registration required. Salary $385-$440. PO-37.

STAFF PHARMACIST—Requirements: 1 year internship and minimum 1 year's experience. 42 hour week; 4 weeks' vacation. Salary $450 plus one meal. 660 bed teaching hospital. PO-38.

STAFF PHARMACIST—460 bed general hospital in Mass. 40 hour week; 2 weeks' vacation; other benefits. PO-40.

CHIEF PHARMACIST—120 bed general hospital. Duties include complete charge of ordering, dispensing, and assist in purchasing. Ohio registration required. Experience in retail pharmacy given preference. 40-48 hour week; 2 weeks' vacation other benefits. PO-44.

ASST. CHIEF PHARMACIST—325 bed general hospital. Must be capable of assuming complete responsibility in absence of Chief Pharmacist. 40 hour week; 4 weeks' vacation. Salary $4500. PO-47.

STAFF PHARMACIST—487 bed general hospital. In-patient and outpatient prescriptions; manufacture of some injectibles. Male or female. Interested in recent hospital internship graduate with high academic achievement. 40 hour week, 2 weeks' vacation; other benefits. PO-48

STAFF PHARMACIST—300 bed general hospital. Ill. registration required. In-patient orders no bulk compounding. 44 hour week, 2 weeks' vacation. Salary open. PO-50.

ASST. CHIEF PHARMACIST—550 bed general hospital. Assume supervision of 5 pharmacists and 2 porters. N.Y. registration required, also 5 years' experience in hospital pharmacy. 35 hour week, 2 weeks' vacation, other benefits. Salary $4500-$5,000. PO-51.

STAFF PHARMACIST—450 bed general hospital. Requirements: B.S. in pharmacy, 1 year hospital pharmacy internship or 1 year's experience professional pharmacy, Colo. registration. 40 hour week, 2 weeks' vacation. Salary $383. PO-52.

PHARMACIST SUPERVISOR—2700 bed state mental hospital. Va. registration required. Male with min. 1 year's experience. PO-56.

ASST. CHIEF PHARMACIST AND STAFF PHARMACIST—335 bed general hospital, located in Fla. PO-57.

CHIEF PHARMACIST—200 bed general hospital. Hospital experience preferred. Male or female, 44 hour week, vacation and sick leave. Salary $5500. PO-58.

CHIEF PHARMACIST—88 bed general hospital—future expansion planned. Experience in purchasing and Central Supply desired. 40 hour week. Vacation and salary arranged. PO-59.

STAFF PHARMACIST—290 bed general hospital. Ohio registration required. Capable of taking charge of dept. in absence of Chief Pharmacist. 40 hour week, 2 weeks' vacation. Salary $4700-$5700. PO-60.

STAFF PHARMACIST—325 bed research hospital. Min. 2 years' experience preferably in hospital pharmacy. N.Y. registration required. Manufacturing sterile solutions and assisting in product development. Salary $4770-$5860 plus benefits. Research work beyond 40-hour week available at $3.00 per hour PO-61.

STAFF PHARMACIST—345 bed general hospital. Must have Ill. registration. Capable taking charge of dept. 40 hour week, 3 weeks' vacation, other benefits. Salary $450. PO-62.

ASST. CHIEF PHARMACIST—100 bed general hospital. Ind. registration required. Young lady preferred. Hospital experience not necessary. Main area of responsibility in Central Supply and Solution Manufacturing. 40 hour week, 3 weeks' vacation PO-63.

PHARMACIST—Animal Hospital. Duties include maintaining drug stock and checkout service, also willing to help students. 44 hour week, 4 weeks' vacation. Salary $5,000. PO-64.

CHIEF PHARMACIST—131 bed general type hospital. Duties include full charge of pharmacy and purchase of drugs. 40 hour week, 4 weeks' vacation. Salary $5200. PO-65.

CHIEF PHARMACIST—75 bed general hospital. Full responsibility for pharmacy and other hospital administrative duties. 40 hour week, 2 weeks' vacation. PO-66.

STAFF PHARMACIST—263 bed general hospital. Eligible registration in Wis. B.S. degree required. 40 hour week, 2 weeks' vacation, other benefits. PO-67.

ASST. CHIEF PHARMACIST—In charge of Central Supply Service at large eastern university hospital. Prefer MS degree in hospital pharmacy. Salary $5548-$6,000 depending upon experience in Central Supply work. PO-68.

ASST. CHIEF PHARMACIST—120 bed general hospital. Must be eligible for licensure in Ark. Male or female. 40-44 hour week, 2 weeks' vacation, benefits. Salary open. PO-69.

CHIEF PHARMACIST—325 bed general hospital. Eligible for registration N.Y. Hospital experience desirable but not necessary. 40 hour week, 2 weeks' vacation. Salary depending on qualifications. PO-70.

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